Linking Land Use and Transportation

Design Strategies to Serve HOVs and Pedestrians

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Washington State Department of Transportation
Washington State Transportation Commission

in cooperation with
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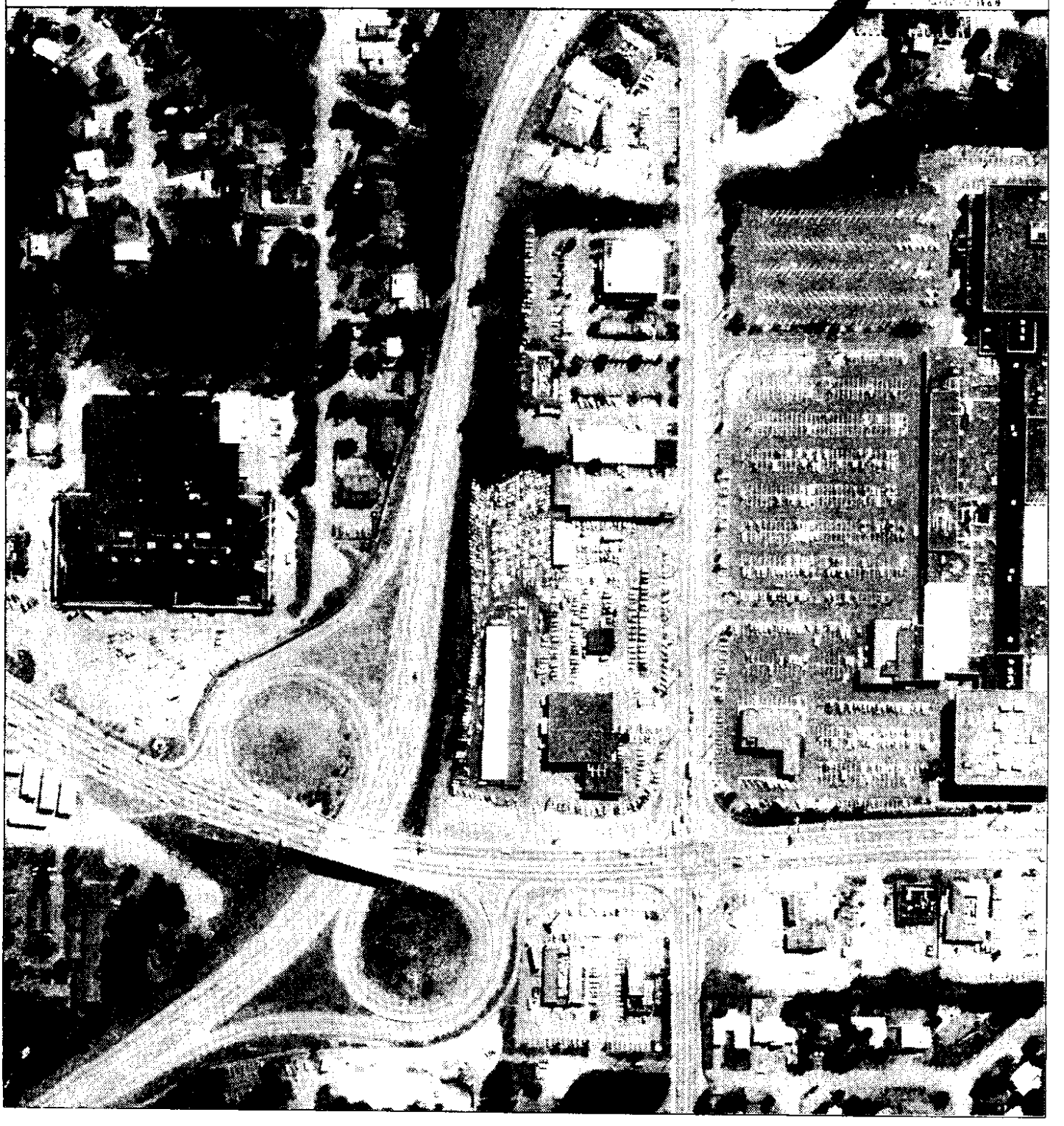
Linking Land ortation
Design Strategies to Serve HOVs and Pedestrians

Prepared for: Washington State Department of Transportation

Prepared by: Richard K. Untermann
University of Washington

Research Assistants: Lesley Brown
Holly Godard
Careen Heegaard
Catherine Maggio
Sandra Strieby



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HOV Lane Use Issues on Arterials

LINKING LAND USE AND TRANSPORTATION

Design Strategies to Serve HOVs and Pedestrians

by

Richard K. Untermann, Professor
University of Washington
College of Architecture and Urban Planning
Department of Landscape Architecture

Washington State Transportation Center (TRAC)
University of Washington, JE-10
The Corbet Building, Suite 204
4507 University Way N.E.
Seattle, Washington 98105

Washington State Department of Transportation Technical Monitor
C.E. Howard, Jr.
Manager, Transportation Planning Office

Prepared for

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Executive Summary

Linking Land Use and Transportation

Getting from home to a transit stop without using a car is the principal transportation problem facing most suburban commuters. Under the current system, the first and last part of a commute trip is made in the commuter's private car. This study explores the concept of Suburban Centers, which would allow commuters to walk or bike from home to nearby arterial streets and board buses or join car or van pools traveling in a special outboard high occupancy vehicle (HOV) lane, instead of driving a private car to a park-and-ride lot. The concept is based on the premise that closer coordination between land use and transportation planners can dramatically reduce the need for travel in private cars, and allow for the accommodation of more commuters through a combination of foot, bicycle, and HOV transit/carpool use.

The park-and-ride idea has its drawbacks, as the lots are expensive to construct and maintain, commuters must own a vehicle that can be left unused during the day, and congestion, air pollution and fuel wastage still remain.

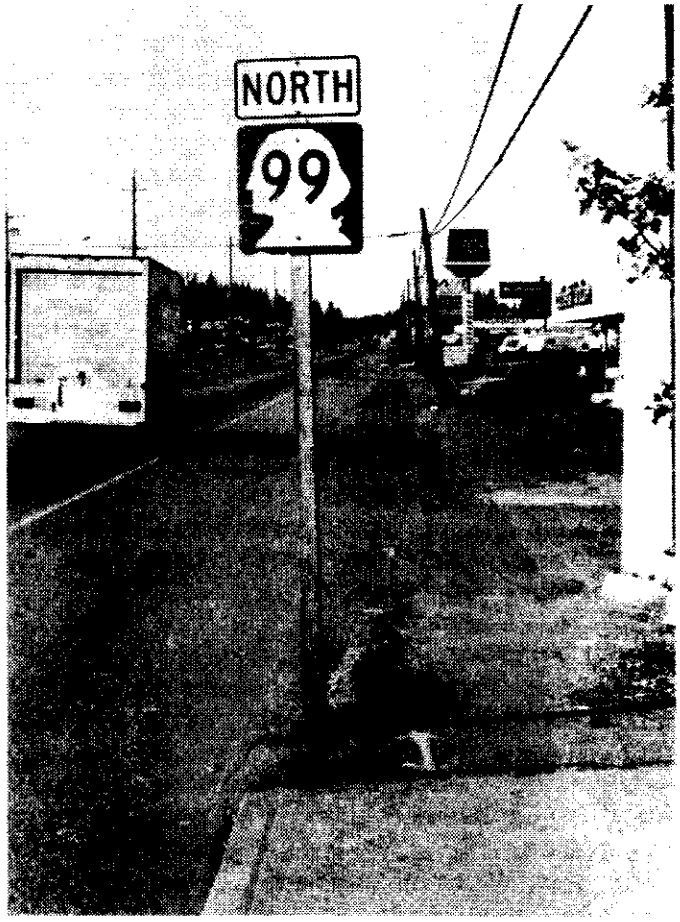
This report explores the land use changes along a major suburban arterial that would make walking and bicycling a workable addition to our set of suburban transportation solutions. Walking and bicycling are cheap, energy-efficient and non-polluting modes of travel and offer a chance to stay healthy through regular exercise. The land use changes we propose would make walking and bicycling safe and comfortable, thereby encouraging riders to walk or bike from home to a transit stop. Transit vehicles, be they bus, van or car pool, would ride in HOV lanes, whisking riders to work, shopping, school or play.

The idea is relatively simple in principle, though implementation may require some adjustments to suburban lifestyles. The biggest change is a shift from our current dispersed, randomly located, low-density suburban land uses to more concentrated, purposefully organized and higher-density developments.

More specifically, most retail uses within the study area—Highway 99 north of Seattle—would be concentrated into several nodes called Suburban Centers—mixed use places with shopping, work and housing all intertwined. The surrounding roads and buildings would be organized to support pedestrian and bicycle circulation, and transit would stop conveniently in the Center.

Land along the highway between the Suburban Centers would be developed with apartments, condominiums and office buildings—uses requiring less active auto access than shopping. Higher-density housing would be in and around the Suburban Centers, and a new pedestrian and bicycle infrastructure would allow residents living in the surrounding lower-density neighborhoods to reach transit, shopping, work for some, and play.

The stretches of road fronted by apartments and offices should have few driveways to interrupt traffic, wide sidewalks and planted buffers. As the road moved into the mixed use center, on-street parking might be allowed, buildings would move close to the street, the street grid would become smaller, and pedestrian activity and access would increase. Higher density is important—to reinforce transit, support local merchants, and promote a sense of community.



Presumably, HOV traffic would move smoothly past the apartments and office buildings and would slow at places where people congregated to shop, work, and engage in other activities. Once leaving those activity nodes, transit and ride-sharing vehicles could move faster until they reached another center, when they would slow.

The Suburban Center pattern is akin to that seen in older Street Car Communities. Interest in such traditional neighborhoods has grown since architect Peter Calthorp coined the term "Pedestrian Pockets" in 1989. Pedestrian Pockets are communities where people live within walking distance of a town center. The town center meets basic shopping needs, and houses some offices, a library, child care facilities, schools, meeting rooms, and a transit stop. There are at least a dozen Pedestrian Pockets in planning or under construction, and many more on the drawing boards. Several in California have been planned in conjunction with one another so they can eventually be connected with a transit system.

With the proposed changes, Highway 99 would be reconfigured with wider sidewalks, street trees, covered bus stops, and pedestrian amenities to serve HOV users. The result could be a para-transit system, utilizing buses, van and car pools, all running on a designated HOV lane that would pick up passengers arriving from home on foot. The need for new park-and-ride lots would diminish, and the corridor would support a dramatic increase of activity and uses.

The current low density land uses are ideal for such a conversion. The zoning along Highway 99 is predominantly commercial, surrounded by high-density residential, so major zoning conflicts are less likely. Much of the land along Highway 99 is vacant—developed as parking lots, or used for storage, auto dealers, and bulk retailing. Many of the buildings are low-density and older with low rents and relatively high vacancy, so conversion would be inexpensive and easy. Lastly, the land is relatively level, and includes an underlying grid system, faint but distinguishable, that could be reinforced through proper planning.

Increasing density and organizing land uses are the most effective ways to reduce travel. Compressing more use on each site, through taller buildings or greater land coverage, reduces the amount of ground travel needed to get from one place to another and to travel within the area. Feet, stairs and elevators replace vehicles.

Increasing density is the key to convincing people to switch to HOV use. Car and van pools are more easily organized when people have closely-placed origins and destinations. Buses run fuller and can run more frequently. Highway 99 is an ideal high-density corridor for the future, where people could live in apartment buildings or condominiums constructed around the activity centers, walk to the Center, run errands in an area offering basic services—dry cleaner, drugstore, market, newsstand, day care facilities, post office, bank, and so on—and then go beyond to the transit stop.

Would People Live There? The largest growth area in the housing market is in providing for smaller, non-traditional families—either people living alone or those living together as unrelated individuals. This market will exceed that for traditional family dwelling units in the near future, and such non-traditional households have typically been better served in small units with access to good public services, shopping, and public transportation. As congestion and the cost of home ownership increase, corridors such as Highway 99 will be desirable places in which to live, work and play.

Do HOV Lanes Work? A Puget Sound Council of Governments (PSCOG) Study shows that regional travel is growing faster than the population, and is becoming more dispersed. The study points out that while population has risen 34% since 1970, vehicle miles traveled have risen 123%. Suburban travel is increasing most rapidly—and this is, of course, travel by car, because of the low density and scattered destinations which characterize suburbia. The problem is made more complex by the relatively small percentage—23%—of daily trips that are solely work-related. The other 77% of trips constitute non-work or non-commute travel.

One of the principal ways to accommodate increased travel demand is to switch from space-consuming SOVs to high occupancy vehicles (HOVs). Transportation planners noted long ago that SOV use was increasing dramatically, and began to take some action by constructing HOV lanes on limited-access roadways. In the Puget Sound region, there are over 15,000 free park-and-ride lot spaces for people to use when catching a bus or van pool. The region has some 40 miles of HOV lane in place, out of a planned 150-mile system, and includes the downtown bus tunnel as a major part of the HOV lane system. HOV lanes seem to be carrying their share of passengers, even if they appear empty to frustrated drivers creeping along during rush hour. On Interstate 5 northbound, the HOV lanes carry 26% of the people in only 5% of the vehicles; on westbound SR-520, the HOV lane carries 42% of the people in 7% of the vehicles.

Would it work? We don't know, but we think so. There are no existing transportation models that can be used to test the idea. All the current models derive from past efforts to accommodate the automobile and policies which control

The use of single occupancy vehicles (SOVs) has been growing almost unnoticed for the last 20 years. One observer has noted that "at the rate that vehicle occupancy is declining, by the year 1995, every third car will be going by with nobody in it."

automobile congestion. Transportation models all assume that suburbs work best when traffic moves smoothly. Actions to enhance smooth vehicular flows — more roads, wider lanes, free right turns, generous turn radius, no parking zones, etc. all compromise pedestrians and HOVs. Each road improvement reinforces our commitment to the automobile — encouraging more people to drive, wasting energy and polluting neighborhoods and towns. The current system, with its overdependence on the automobile, is on the verge of not working. Surely it is worth testing the idea further.

Conclusion

The land use patterns proposed by the Suburban Center model are in accord with the current thinking about adjusting suburban land uses to meet transportation needs. For instance, the PSCOG's recent recommendations all include Centers, higher densities, and specifically located uses. Peter Newman and Jeffrey Kenworth's new book *Cities and Automobile Dependence* (Gower Publishing Co; Brookfield, VT: 1989) notes the major physical planning characteristics conducive to lessening automobile dependency are:

- more intensive land use
- orientation of transport to non-automobile modes
- restraint on high speed traffic flows
- centralized land use, and
- better performing public transport

Section 1

Linking Land Use and Transportation
Altering Land Uses to Serve HOV's and Pedestrians

Introduction

The main streets of most suburban communities in the United States are wide arterial streets designed to accommodate motorized vehicles. With cross-sections as wide as six to eight lanes, these arterials serve as the transportation backbone and lifeline of suburban communities, providing linkage between different communities. Suburban residents depend on these arterials, and their cars, to move them quickly between destination points: home, work, schools, shopping and recreation areas and other communities.

Reflecting the square-mile grid patterns established when land was first surveyed by the U.S.G.S., arterials are frequently one mile apart on north-south and east-west axes. When cities and towns were first settled, their streets laid out along grid lines served both pedestrians and motorized vehicles. As cities grew, public transit in the form of streetcars transported people farther from downtowns to their neighborhoods, where homes and businesses were located within walking distance of the streetcar stop. In the 1950s as automobiles began to replace public transit as the preferred means of transportation, people settled farther from city centers. Some major streets were extended beyond city limits to serve newly developed suburban communities, whose locations were more often determined by the price of the land than land-use planning. Within suburban communities decisions about locations of homes, shopping areas, parks, schools, and virtually all other suburban land uses were based on the cheapness of the land. Proximity and convenience for pedestrians and transit users were not major determinants because automobile travel became the primary means of transportation.

Photo 1.1 Highway 99 - 7 lanes wide, with its uncordinated low density land uses and limited pedestrian area, suggests thru movement with an occassional stops for shopping

Along arterials that connect suburban communities to cities and each other, long strips of commercial development oriented to the automobile user have developed. Where once pedestrian-oriented neighborhood businesses were clustered at intersections related to streetcar and transit stops, commercial establishments, singly or in linear strips, now are spread out along arterials, giving rise to the term "strip development." Concentrated at some intersections are shopping centers, sited for visibility and accessibility via the automobile. As with commercial establishments of all scales, apartment complexes and single-family homes along suburban arterials are accessible from individual driveways onto the arterial or from a neighboring street and are separated from each other by fences or grade changes. Noticeably absent from these auto-dominated arterials are pedestrians who are discouraged from walking by long destination points, vast expanses of parking lots, and potential conflict with automobiles and trucks.

Photo 1.2 Auto oriented strip development make HOV transit use difficult.

When many suburbs were developed, coordination between transportation and land use planning was virtually nonexistent. Transportation planners avoided land use issues because they knew that involvement would dramati-

cally slow road construction. At the same time zoning codes were flexible enough to allow scattered land uses. As a result, the lack of integration between land use and transportation planning has resulted in dependence on the automobile, frequently driven by a single occupant, and in hazardous conditions for pedestrians and bicyclists. Recognizing problems created by lack of integration, some jurisdictions are changing their land use codes to require developers: (1) to pay for roadway changes accommodating increased traffic caused by their developments and (2) to design their developments so that walking, bicycling and public transit can be alternatives to automobile travel. For example, Kitsap County, a rapidly urbanizing county in Washington, requires new commercial development fronting on arterials to be accessed from side streets and requires it to provide pedestrian and bicycle access points to adjacent communities. Loudoun County, Virginia, has adopted a "rural hamlet" zoning ordinance that provides an alternative to conventional subdivisions permiting compact grouping of homes.

As metropolitan areas, such as Seattle, have experienced dramatic growth in recent years, suburbs have developed farther and farther from city centers. Major arterials between suburbs and cities are under increasing pressure to accommodate more vehicles, preferably at higher speeds. The demand is particularly acute at peak travel times or whenever alternative routes are overcrowded, for example, when there is a traffic accident or special event. As a result, traffic has become such a significant problem that it diminishes quality of life for residents of many metropolitan areas, including Seattle. For example, the Boeing Company located in Seattle, Everett and Renton, Washington, recently announced it would expand outside the Seattle area if the region's transportation problems could not be solved. The speaker noted that while it used to take an hour to drive from Renton to Everett, now it takes about the same amount of time to drive through Renton.

Solutions to traffic congestion problems are being sought through changes in land use and different approaches to transportation. Because the problems are complex, an integrated approach to their solution will be needed, and changes cannot be expected overnight. In an attempt to address land use and transportation issues, current growth plans in many communities call for less sprawl and more infill development. Making more efficient use of existing roadways is being explored and tested in communities across the United States. For example, in the Seattle area *ride-sharing*, utilizing transit and carpools to reduce the overall numbers of vehicles and lessen congestion is being used effectively. Ridesharing is encouraged by the establishment, particularly on limited access roadways, of *high occupancy vehicle (HOV)* lanes that can only be used by transit or automobiles with a minimum number of passengers. Municipalities that are exploring the potential benefits of an integrated approach to future land use and transportation planning see an opportunity to give their communities and ultimately the residents they serve a new lease on life.

Objectives of This Study

This study will focus on the relationship between land uses and transportation along a major arterial, exploring ways to encourage pedestrian use of and access to arterials. It will explore in detail the possibility of using high occupancy vehicle lanes along arterials for short-distance ridesharing. With emphasis on improving pedestrian and bicycle safety and creating a sense of "community" along the arterial, the study will examine problems of street design and potential land use profiles.

Study Area

The study focuses on a 9-mile stretch of Highway 99 in north Seattle, from Seattle's city limits (at 145th Street) to the Mukilteo Speedway. This section of SR 99 in north Seattle has been chosen for HOV development and will serve as the case study for this project. The road varies in land use and jurisdiction; it passes through two counties and one city. Roadway configuration varies from 5 lanes with parking in

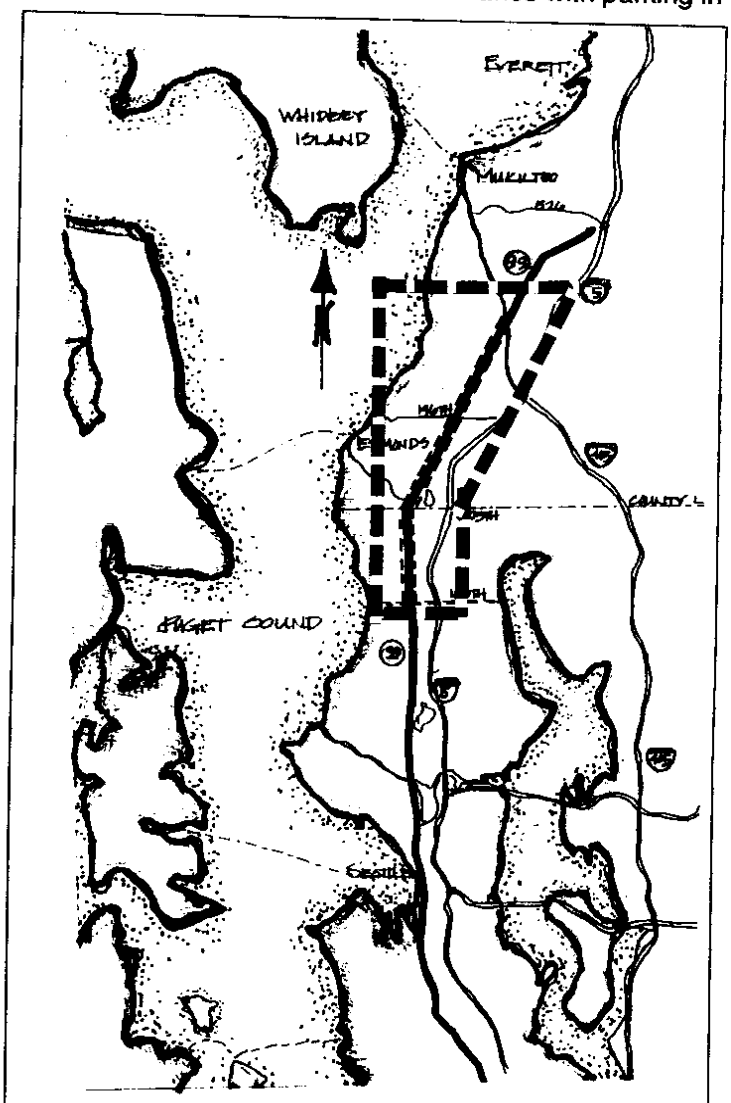


Figure 1.1 Site Vicinity Map

the south to 7 lanes with no parking in the north. (See Figure 1.1)

Highway 99 originally served as the Seattle area's principal north-south highway, part of a route from Canada to Mexico. When construction of Interstate 5 in the mid-1960s altered its intrastate purpose, it became an intercommunity arterial supporting extensive suburban development. Since its construction, the configuration of the road and adjacent land uses have been auto-oriented. Wide, smooth travel lanes have encouraged traffic flow. Cheap land and inattentive governments have allowed mostly retail uses with uncoordinated, separate development, deep setbacks and an abundance of parking. Buildings are set back from the road, and individual lots are separated from each other by fences and grade changes. Sidewalks are sparse, unconnected and adjacent to the road, providing little protection for pedestrians and no amenities to attract them. Even the signage is directed exclusively to motorists.

Background

Relationship between Land Use and Transportation

For the last 40 years in most areas of the country, transportation planning and land use planning have functioned separately. Decisions have generally made by government entities and developers with different agendas, and public pressure to coordinate was negligible. Sometimes the match has worked, though often only when land uses and transportation corridors were completely separated as with interstate freeways, limited access highways, new communities, etc. Sometimes the relationship has been neutral as with lower-density and rural communities, but most often it has been a total mismatch as exhibited by the strip development along most arterials.

Master Planned Communities. In another example of mismatch, the free-flowing arterials of Master Planned Communities have minimized the interaction between land uses and transportation. A typical arterial might have six lanes, plus a center turn lane, and no on-street parking. Most likely, it is separated from adjacent land uses by a landscape buffer and fences. There are no curb cuts or driveways between intersections, which are spaced at considerable distances. Because the alignment is smooth and free-flowing, traffic moves at relatively high speeds. Interruptions to the flow of traffic are few since the occasional signalized intersection is timed to favor through traffic and to bypass roads, frontage roads and side streets which provide access to other land uses (See Photo 1.3).

Streetcar Communities. In sharp contrast, many West Coast "Streetcar Era" cities, such as Seattle, developed a street system where land use was closely linked with transportation. The shopping street had two or three lanes of traffic, with parking on both sides. Wide sidewalks and narrow fronted shops lined both sides of the street. Stores were organized to serve everyday needs—grocer, bank, drug, hardware, clothes, etc., all side by side. Alleys handled overflow parking and service. Nearby residents could walk and carry out all their shopping needs, while more distant residents would drive, park and then walk to all the different stores (See Photo 1.4).

Photo 1.3 Newer developments have sidewalks and some coordinated driveways. However, the walks are too narrow, and adjacent to fast moving traffic, and the drives are too wide, allowing motorists to cross the sidewalk too fast.

Photo 1.4 Neighborhood shopping streets of Street Car communities had wide sidewalks, shops directly on the street, on-street parking, and often rain protection. Window shopping and narrow fronted shop make it ideal for pedestrians.

The residential streets of these communities were about 25 feet wide with six-foot-wide sidewalks and six-foot-wide planting strips on both sides of the street. Parking was normally allowed on both sides of the street, with 2-way vehicular travel sharing the remaining street width. The resulting roadway was too narrow to allow passing. Since speeds were slow, through traffic tended to avoid these

streets. The land use transportation match was perfect: kids could play safely on the street, pedestrians felt safe, noise from traffic was minimal, land wastage was limited, and walking rather than driving was encouraged. This type of land use/transportation integration can serve as a model for future planning for arterials, many of which began as streetcar streets.

Modified Shopping Center. Some newer shopping centers along arterials are organized to serve both pedestrians and automobiles through careful site design. One Seattle example is the Oak Tree Plaza on Aurora at 100th — a neighborhood center with a major grocer, multiplex cinema, and 20 accessory stores. All the buildings are located along the perimeter of of the site, instead of in the center or along the back property line. Pedestrians and vehicles share the internal space, with parking tightly organized so cars can not travel fast. The Center is bisected by a well developed pedestrian grid, allowing easy access to and between buildings. Two wide sidewalks cross the parking lot, and roof overhangs protect pedestrians during bad weather. The sidewalk on Aurora is wide, with street trees, shop windows and pedestrian entries at several points. Shoppers arrive by car, park, and carry out all their errands on foot as parking is limited.

Photo 1.5 Tight, defined parking slows vehicles, allowing pedestrians to walk safely throughout the Plaza. Sidewalks and marked crosswalks make the place feel pedestrian friendly.

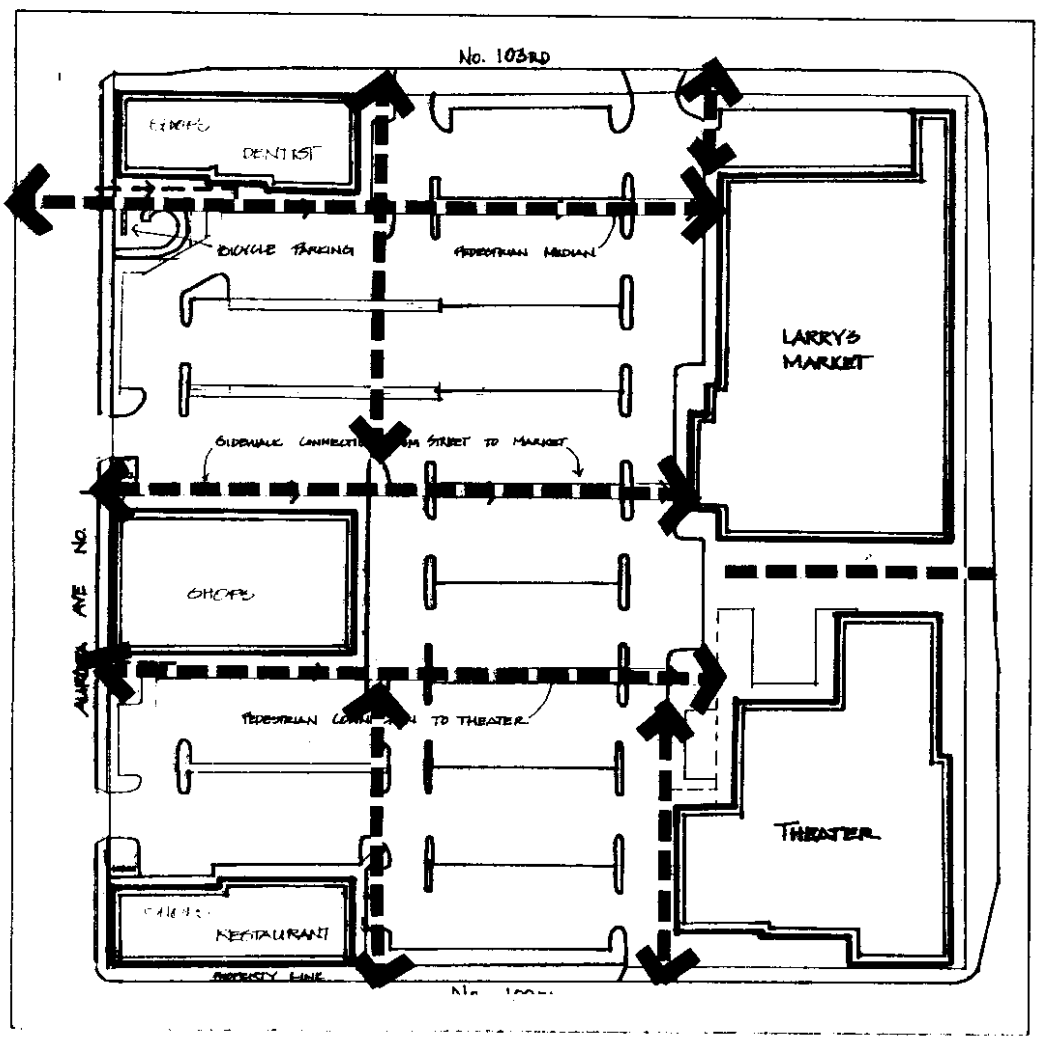


Figure 1.2. Plan of Oak Tree Plaza. This neighborhood shopping center serves both vehicles and pedestrians. All the buildings are located adjacent to the streets with wide sidewalks all around it. Pedestrians and cars share the interior space with a tight parking arrangement to slow down cars. A strong grid of sidewalks links all the shops with apartments and houses that surround the center. An old school overpass connects to neighbors across 99.

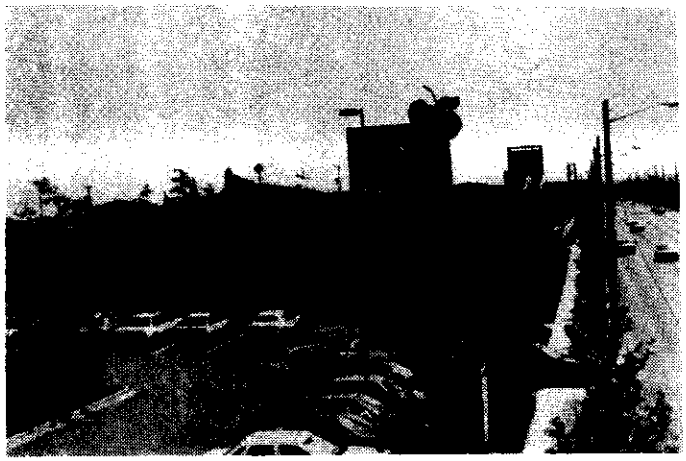


Photo 1.6 The street around Oak Tree Plaza has a wide sidewalk (8 feet) with trees and a planter strip between it and any parked cars. Note how the buildings are constructed right up to the street.

Photo 1.7 All parking spaces are defined by curbs with street trees. The major grocery store has a wide covered wallk in front of it, further serving pedestrians.

HOV Travel

As traffic congestion has worsened on highways nationwide, HOV lanes have been developed for express, long-distance use. However, express HOV use is limited by the availability of park-and-ride lots, which are being constructed far too slowly to meet demand. This problem has given the first hint that perhaps "pedestrian access" to HOVs is a possible solution. Pat Hare, a planning consultant firm in Washington, D.C., reported that many private cars picked up riders along their way to work in order to be able to use HOV lanes and take advantage of the convenience of traveling at greater speeds. Hare reported that the private automobile was becoming a *de facto* public transportation system because of easy access to riders, and the HOV lane.

Suburbanization has created mobility problems for the transit dependent. These include people with physical handicaps, low income people, and the young and old. For these people, the journey to the transit station is the most difficult part of the trip. Bus stops are often on the gravel shoulder of busy roads, with no safe connections back to the neighborhood.

Photo 1.8 Metro recently completed construction of a short length of outboard HOV lane near the University hospital. The lane allows buses to get a jump on traffic during peak periods.

While car pooling in private vehicles from transit stops may not discourage automobile use, it may be a realistic alternative to single-occupancy travel. In Washington, D.C., carpooling from transit stops to destinations such as the Pentagon and other large employers has been successful. This option is apparently preferred to bus travel, because the trip is shorter. Bus riders in Washington, D.C., find that, though the express portion of the trip is quick, the time savings are lost when many stops are made at the end of the journey. Additionally, commuters find the ride to work more comfortable in a luxury car than on the bus.

Types of HOV Lanes. HOV lanes are generally located on inner lanes where the fastest traffic moves. This location and faster speeds are appropriate for express-type travel to distant destinations. However, for arterials where there will likely be more frequent stops and shorter trips, use of the outer or "outboard" lane for HOV travel will be examined. The advantages are ease of use, convenience and the opportunity to extend HOV use to pedestrians and bicyclists. On the other hand, the disadvantages are obvious: travel in the outer lane may conflict with vehicles turning right from an intersection, with vehicles entering and exiting driveways along the road, and with vehicles entering the arterial from cross-streets. All of these potential conflicts, as well as the proximity of fast-moving vehicles, may create a dangerous situation for the pedestrian. Even though the feasibility of the outboard lane raises many concerns, its possible benefits make in-depth examination worthwhile. (See Photo 1.8).

Potential Problems of Adapting HOV Travel to Arterials with Frequent Access. Providing comfort, convenience and enhanced pedestrian safety may encourage people to try ride-sharing. While HOV lanes on existing arterials could enhance pedestrian activity, as transit and carpoolers often make a portion of the trip on foot, they could also create potential conflicts. Higher speeds of automobile travel can be disruptive to adjacent uses. Fast moving and turning vehicles can be dangerous for bicyclists and

pedestrians. In addition, making room for new travel lanes may be difficult, given competing uses for the space. Thus, the two major problems that must be overcome in adapting existing arterials to serve pedestrian-friendly HOV uses are:

1. **Arterials are continuous, unrelated strip merchandising streets** where automobile access is essential and walking is almost impossible.
2. **Pedestrians can't walk safely from the arterial to nearby housing or work places.** Lack of safe and comfortable pedestrian access makes it difficult for potential ridesharing passengers to reach the HOV.

Previous Study

In 1991, students from the University of Washington developed alternative land use and transportation schemes for the study area. These schemes were evaluated, and the most realistic concepts were identified for additional study. Further study refined the various development and transportation schemes, including an assessment of feasibility. The initial study explored the six techniques traditionally used in reducing single occupancy vehicles as follows:

1. Improving Pedestrian and Bicycle Access.
Completing a safe and serviceable sidewalk system which is separated from fast-moving cars, connects residential neighborhoods with shopping, transit, schools, parks, and work.

2. Controlling the Automobile.
For the pedestrian to move safely and comfortably, cars must travel at slow enough speeds so they are non-threatening to all types of pedestrians. Controlling the automobile involves slowing traffic through the use of street diverters, traffic circles, one-way streets, local access zones, narrower road sections and speed bumps.

3. Extending Pedestrian Opportunities.
This means providing ample, safe and complete sidewalks, shortcuts, weather protection, benches, landscape buffers, lighting and directional signage. People will tend to walk farther and longer if the trip is appealing, comfortable, friendly and convenient.

4. Providing Ride-Sharing Opportunities.
These include transit, carpools, vanpools, and ride-sharing opportunities.

5. Linking Land Use to Transportation Purpose.
This can be accomplished by determining the priority and balance between automobiles and pedestrians along the road and by determining the amount of access needed to reach various land uses along the road.

Photo 1.9 Seperate, detached buildings with no vehicular or pedestrian connection between compound the functioning of Highway 99's land use and transportation. If the road is connected, the land uses must also be.

Study Approach

In examining relationships between land use and transportation along Highway 99, this study will focus on the pedestrian. The assumption is made that non-express HOV lanes will work only if riders have access to them via several means: on foot, bicycle, carpools, van pools and buses. It is also assumed that large-scale Park-n-Ride lots would be inappropriate because of the costs of acquisition.

The study will be divided into four segments as follows:

1. **Design strategies for the entire road**—appropriate land uses along the entire road length
2. **Detailed Design Studies of Existing Land Uses** showing options to enhance pedestrian access.
3. **Shaping the road to meet land use needs.** The street design section illustrates street design options to meet pedestrian needs.
4. **Implementation Suggestions**

New Design Strageties for The Entire Road

Introduction

The pattern proposed by most planners for integrating land use and transportation on arterials is to develop "centers" at major intersections, and to replace the retail uses in between with either commercial or residential developments (see Figure 2.1).

The centers, called *Suburban Centers* in this study, would have mixed uses, higher densities than currently exist, and would be scaled to pedestrians. They would concentrate retail, commercial, and housing users at the intersections of selected major cross streets. Driveway access would be limited along most of the arterial, requiring entrance from the cross streets, frontage roads or shared driveways. Ideally, the suburban centers would be connected by sidewalks to nearby residential communities, allowing residents to walk to shopping, recreation, transportation and, for some, work. With increases in attractions for pedestrians and transportation alternatives, including ridesharing via an HOV lane, it is assumed that automobile use would decrease.

Current Land Use Along 99

The uses along Highway 99 are typical of most prevalent suburban land uses—buildings set back from the roadway a considerable distance, with parking between the building and the road. Each building is likely to include a separate parking lot, connected to the road with one or two driveways. Adjacent parking lots are seldom interconnected. The pedestrian is poorly served, as most of 99 is without a sidewalk. Some larger complexes have narrow walkways connecting several businesses, but those are an exception. Access between the sidewalk (if one exists) and building is minimal, and the sidewalk is punctured by a large number of driveways.

Land uses on either side of the arterial are also disjointed and single-use. Residents have a difficult time accessing the arterial on foot, and their ability to take buses, van pool or share rides is limited unless they drive to a park-and-ride lot.

The current zoning along the road is predominantly commercial or high density residential. Though each jurisdiction varies slightly, in general the zoning would accommodate most of the uses that are proposed in this study. (see Figure 2.2).

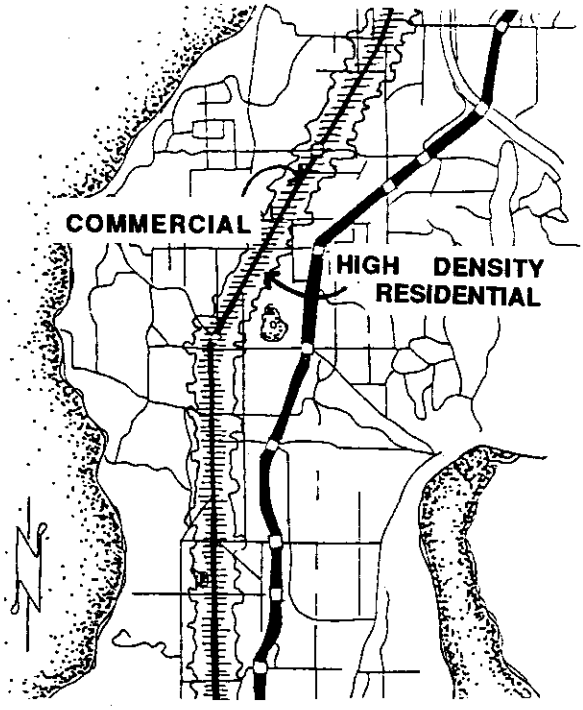


Figure 2.2 Diagramatic Existing Land Uses

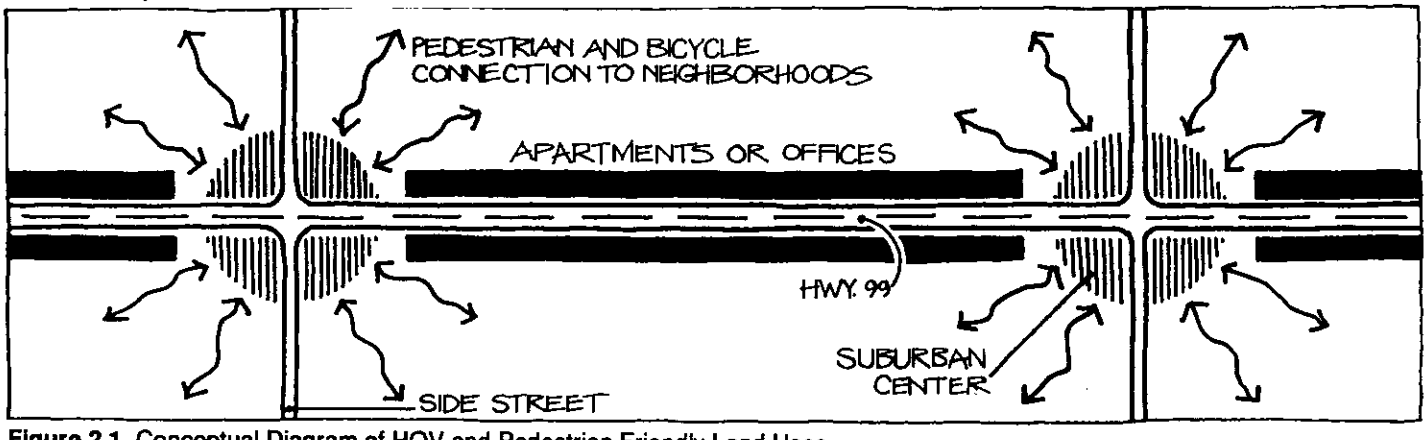
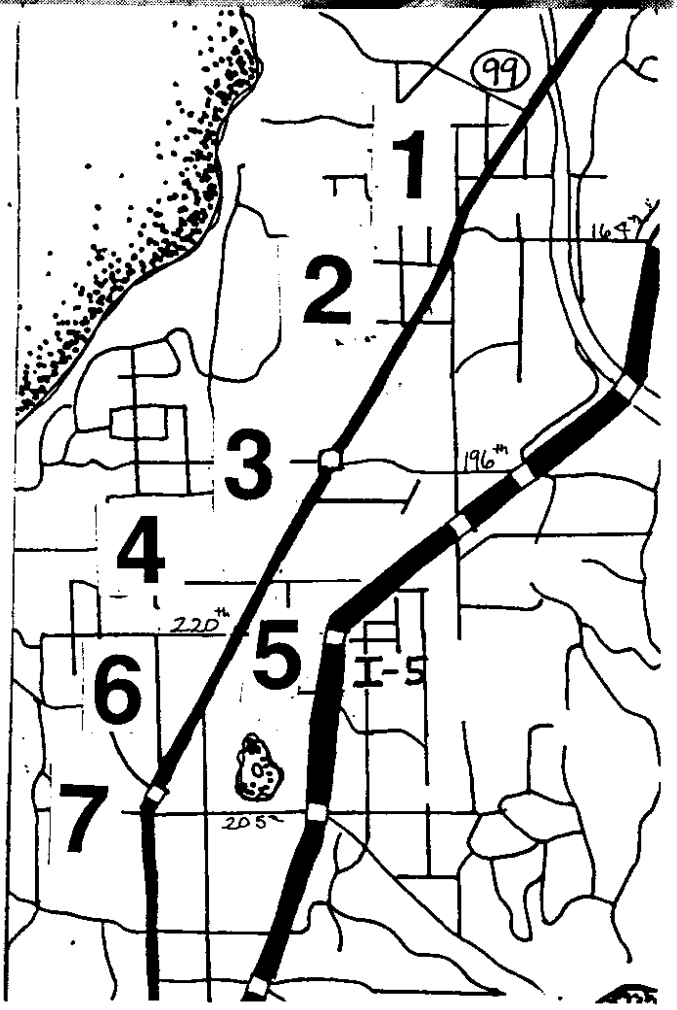


Figure 2.1 Conceptual Diagram of HOV and Pedestrian Friendly Land Uses

Description of Study Area

(shown north to south)



1 The massive apartment complex called Canyon Springs and others nearby suggests a major Suburban Center opportunity at nearby Keeler's Corner. This area offers dramatic views to the west, however, no existing compatible pedestrian-oriented shopping is within walking distance. From here towards Speedway, there are a number of small-scale apartment complexes that come fairly close to the road, plus a multitude of low-scale retail.

2 Around 186th S.W., the land use becomes very low density mostly warehouse-used parts, storage, scrap yards, etc. There are no sidewalks or full HOV lanes. At 176th and beyond the addition of some home-oriented warehouses begins (i.e. Home Club, Dunn Lumber, Jack Robert's Appliances, Olson's, etc.). The road by the Home Club is very wide, with a sidewalk, five lanes of traffic plus full HOV lanes in both directions. There are low density, single family houses to the east and west approximately two blocks, and all in all an absence of urbanity here; it's very loose, open and unfriendly.

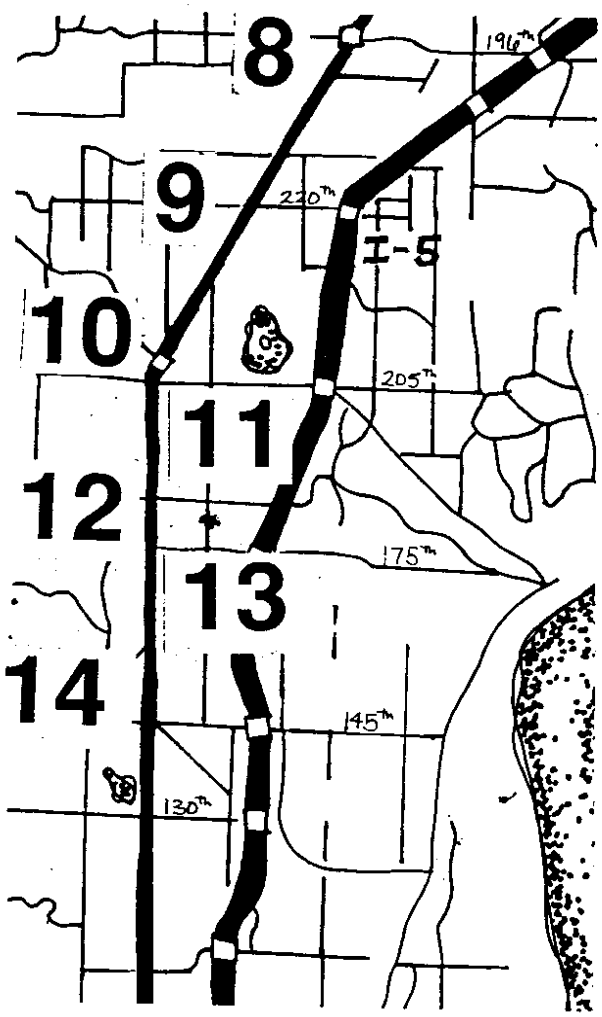
3 Around 196th, the streetscape changes, and includes a sidewalk separated from the street and adjacent uses by lawn. This new shopping center has some visual appeal though it's still heavily auto-oriented. Across the street at James Square, the new planting has improved its appearance from the road, however, it's still vastly inadequate from a pedestrian perspective. Beyond 196th there are a number of small-scale head-in parking, forty retail developments and a large Costco market with sidewalk and street trees. The road is the standard five lanes plus two reasonably adequate HOV lanes. The sidewalk is generally inadequate, though there appears room to install one.

4 The road continuing north has some degree of order—occassional street trees and sidewalks; however, there's still a large portion of it that is in disrepair. Some of the sidewalks are older, and more driveways exist than are really needed. At 216th st. S.W., the road includes a proper HOV and some sidewalk separating the used car lots from the pedestrians. This is in Lynnwood where there appears to be a stronger design emphasis. Driveways are organized (for instance a Safeway at 212th enters primarily off the secondary street, and the parking lot is separated from the sidewalk by a planter. However, the Safeway is still set back from the road and access to it on foot is difficult. There are no other uses at 212th that suggest permanence—two service stations and two fast-food-like businesses.

5 The uses at 220th are easily replaced as the investment is very minimal.

6 At 224th—a minor intersection, there is a K-Mart, but no other development nearby that suggests this is a major shopping node. The other developments are modest retail with the exception of an auto dealer and a small strip mall that is a more recent investment

7 The Pacific Park apartment development has a parking lot in front which is a disadvantage for pedestrians (though it does offer some noise reduction).



In Lynnwood at 200th S.W., the buildings are all low-scale including some street-oriented shops, but mostly small auto-oriented drive-ins . 8

At 238th, a new neighborhood shopping mall is under construction—with typical auto oriented setbacks and parking between it and the sidewalk. There is a sidewalk all the way around the center, though it is not separated from the street with any pedestrian safety barrier. Beyond that around 234th, the road opens up and there are several apartment buildings right on the road (Pacific Park, for instance). The rest of the land use is very low-density, some storage and uses that could be easily converted from retail to housing. 9

The freeway intersection at 205th is a major hazard for pedestrians, with major auto dealers, manufactured homes for sale, and service stations and fast-food restaurants covering all corners. This is an ideal area for auto-oriented uses to be concentrated. 10

Beyond 185th by the park-and-ride lot, the road is five lanes plus modest HOV on each side. The edge definition is minimal, pedestrian services virtually nonexistent and shopping is all independent individual retailers that are strictly auto-oriented. Residential apartment complexes line both sides of the street until Aurora Village, with the densities quite high. The road at Aurora Village (around 200th) has the same street section but sidewalk access to the Village is abysmal despite the relative high-density housing that surrounds it. 11

The intersection at 185th includes a Fred Meyer store on one corner, Dunn Lumber on another and small-scale retail outlets on the other two corners. The low density development leaves plenty of room for increasing density and changing land uses as the investment in buildings is modest. 12

There is at the intersection of N. 155th Street a neighborhood shopping center with a Safeway and other compatible shopping, and a sub regional mall. The area is distinctly automobile oriented, with lots of vehicular movement back and forth from the Aurora Square Shopping Center with Sears, Marshalls, etc. The road geometry is complex because of the angular intersection of the old interurban trail, though there is still a remnant grid pattern that could be enhanced with sidewalks and street trees. 13

Highway 99 just north of 145th has a modest HOV lane, and three lanes of traffic in each direction plus a center turn lane. The sidewalk is nonexistent, or in very bad shape with major vehicular interruptions and no safety or handicap features. Land uses between 145th and 155th are small-scale strip and individual retailers set back from the road and separated by parking. At about 146th, the road shifts from three to two lanes in each direction plus HOV space and a center turn lane, with scattered sidewalks. 14

Typical Land Uses Along Highway 99

Photo 2.1 Long stretches are developed to a very low density, with ragged, ill defined edge

Photo 2.2 Auto dealerships face directly onto 99 in many places

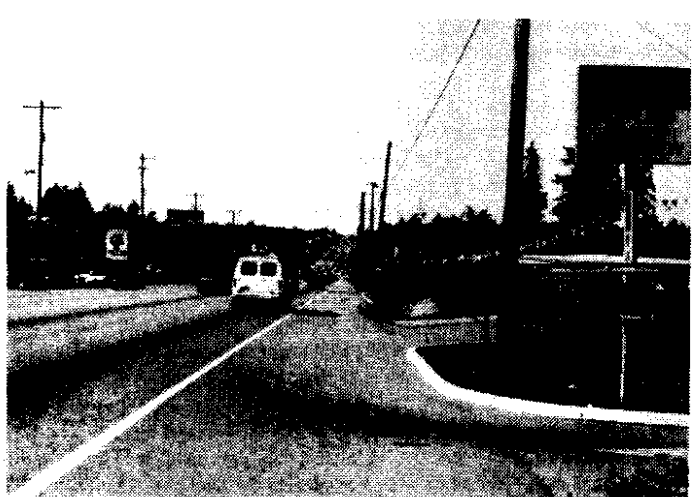


Photo 2.3 Strip development is the predominant use, the direct on street parking on Highway 99

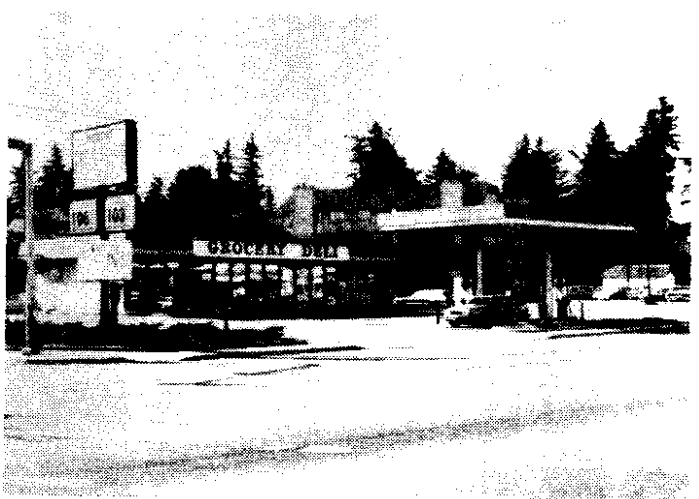


Photo 2.4 Fast food, drive ins and gas stations are frequent uses, often with no curb or defined driveway

Photo 2.5 Neighborhood shopping centers occur every mile or so, set back with a large parking lot.

Photo 2.6 Newer mini-malls organize several businesses around a common parking lot, with pedestrian friendly streetscape and some walkways between shops

The larger complexes such as malls and neighborhood shopping centers work better. Shared driveways keep the streets relatively smooth and free-flowing. Stores are connected internally, so drivers can reach businesses within a mall—either by walking or driving.

The Graduate study suggested three general land use adjustments to enhance ridesharing in the outboard HOV lane. They are

1. Increasing density and mixing uses in selected Suburban Centers,
2. Converting the remaining strip to less dependent auto uses (apartments and offices), and
3. Improving pedestrian and bicycle access to the nearby residential neighborhoods.

Enhancing pedestrian and bicycle circulation in nearby residential neighborhoods would involve Capital Improvement Projects: constructing sidewalks, shortcuts, and improving street crossings. Some bicycle improvements could be as simple as striped lanes in existing streets. The most challenging work involves finding ways to connect cul-de-sacs with nearby streets, thus converting the existing road hierarchy to a more grid-like road system. Minimizing the distance that pedestrians have to walk is critical to encouraging that means of travel.

Photo 2.7 Walkways through parking lots help shoppers walk from the street to stores.

Suburban Centers

These centers should have a variety of compatible shopping opportunities akin to the old-fashioned small town, a mix of grocery, drug, hardware, bank, doctor, dentist, laundry, shoe repair, etc. all in close proximity. Retail space can encourage pedestrian activity. For example, Portland, Oregon's, downtown plan requires that every new building provide retail space at the street level. The objective is to provide a pleasant, rich and diverse pedestrian experience. Shoppers could walk or drive to the center, and then reach all the stores and services on foot from one parking space. Pedestrian orientation should be strong, and the adjacent arterial should be reconfigured to safely accommodate pedestrian use. In other words, the arterial would be narrowed so traffic moves at a speed to allow safe crossings. Sidewalks would be wide and preferably separated by on-street parking from the moving traffic.

On-street parking should occur in these shopping districts as well as on main streets and around apartment complexes. In earlier times, on-street parking was the norm. Only recently has on-street parking been eliminated to enhance through traffic and increase road carrying capacity.

Designating "Suburban Centers" on Highway 99 is relatively easy, because major cross streets occur approximately every mile, and the most intensive activity already happens around these intersections. (see Figure 2.3) In addition, these locations have been chosen because (1) they are connected directly to the I-5 express lanes; (2) they represent large land holdings that could be developed into Centers; and (3) they could provide foot and bicycle access to large numbers of residents and workplaces. The Center's role is similar to that of business districts in the streetcar communities: the passengers would disembark from their shared ride, carry out an errand or shopping task, and then walk or bike the 10 or 15 minutes to their home or apartment.

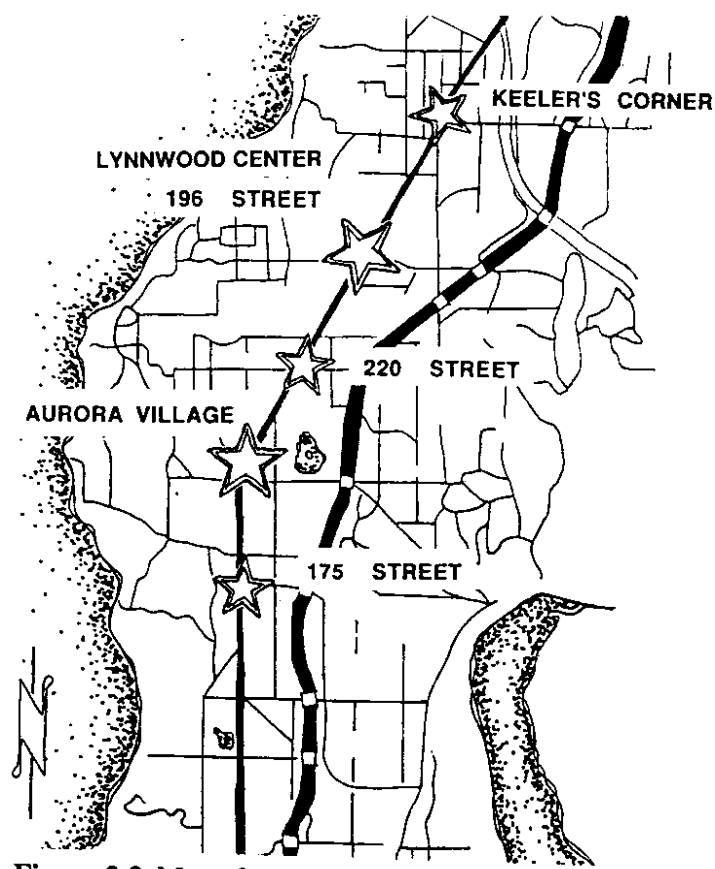


Figure 2.3 Map of suggested Suburban Centers

Suburban Centers occupying two corners of the intersection, across the secondary street, would also allow efficient operation of the HOV lanes on the major arterial. However, if the Suburban Center occupies three or four corners of the intersection, pedestrians would need to cross the major arterial. (See Figure 2.4) In this situation, the arterial should become narrower, traffic should travel slower, and generous signalized crosswalks should be installed. It would have to be accepted that through traffic efficiency would be compromised.

Most suburban Centers examples along 99 occur on one corner—Aurora Village, Keeler's Corner, and 145th. Examples of 2-corner Suburban Centers occur on 155th and 175th. Examples of 3-corner Suburban Centers occur at Lynnwood Center. There are no examples of a 4-corner Suburban Center on Highway 99.

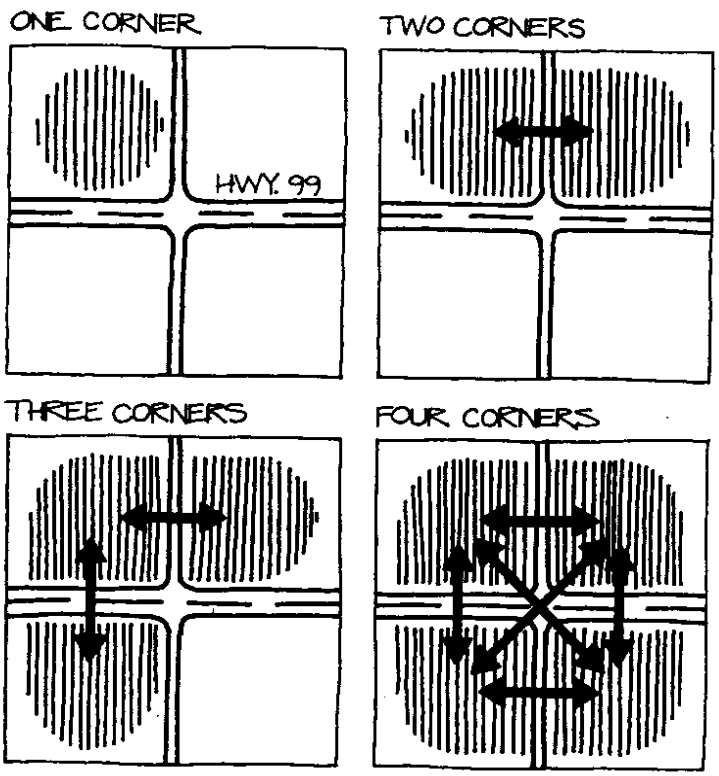


Figure 2.4 Diagramatic arrangement of Suburban Centers around Highway 99

The size and form of the Suburban Center would depend on the intensity of activity. At the least, it could occupy one corner of an intersection, presumably the quarter that related to the largest residential neighborhood. An example of this is Aurora Village at 220th. Containing the Suburban Center within one corner would reduce the need for people to cross major streets, and would allow HOV lanes to function efficiently.

Some Suburban Center Options

Main Street Option. One suburban center model could be the traditional Main Street, with shops on the ground floor, and offices or housing above. The roadway could have a lane of traffic in each direction with angled parking and a sidewalk on both sides of the street. If such a shopping area is located on the arterial, the sidewalks must be wide (at least 12 feet) with street trees, benches and bus shelters. Preferably, on-street parking should be allowed; this will provide protection for pedestrians from moving traffic. If the shopping street is internal, then clearly marked and frequent connections to the HOV lane are important. (See Photo 2.8)

Photo 2.8 Street Car Community Neighborhood shopping with shops directly lining the street and direct parking on street parking

Alternative to Frontage on Busy Arterials. Facing pedestrian friendly shopping toward wide, busy arterials may not be a good idea. An alternative is to have the front of retail businesses facing away from arterials onto less busy streets

Photo 2.9 Backage. If buildings facing the main street are called Frontage, then buildings facing the back street should be called Backage. This example across the street from Dunn Lumber could serve a large neighborhood if developed. Side street growth.

with slow-moving traffic, on-street parking, generous sidewalks, shops directly on the street, a mixture of housing, work and shopping—all the ingredients to create a vital pedestrian area. If clear and frequent pedestrian access were provided to the arterial, traffic alternatives such as the short-trip HOV lanes could operate efficiently. Examples of these opportunities occur along a corridor at 175 near Fred Meyer.

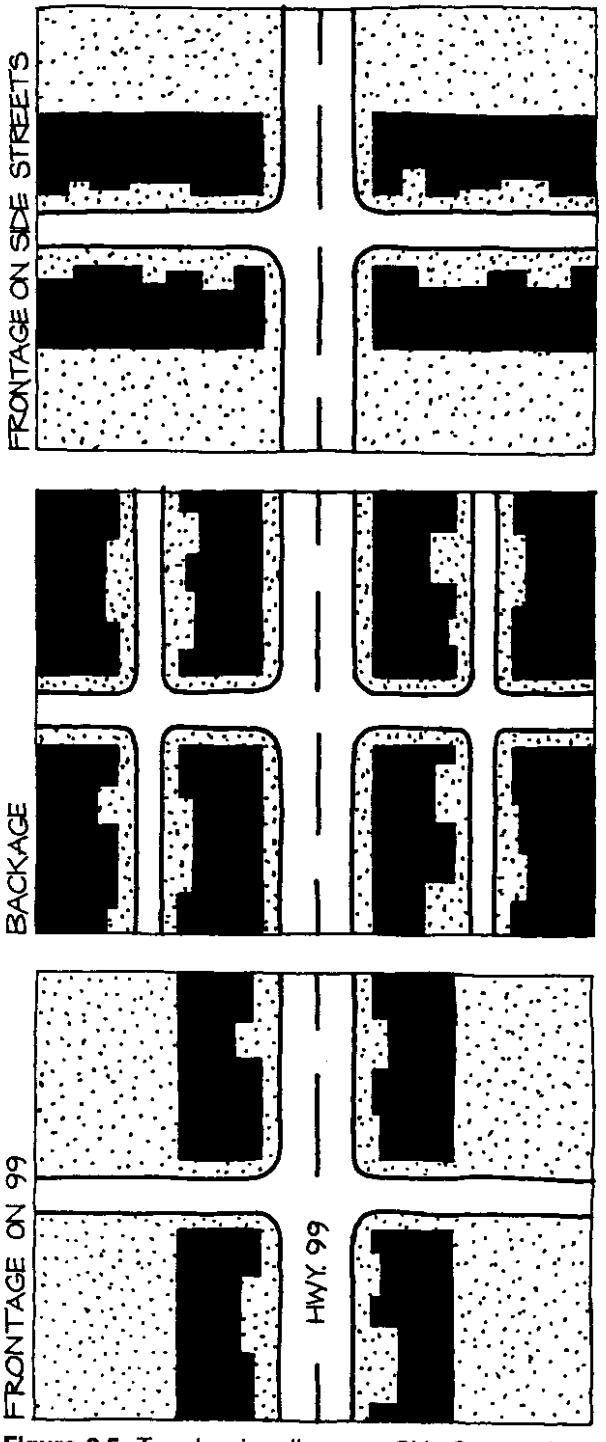


Figure 2.5 Top drawing diagrams *Side Street*, middle drawing digrams *Backage*, bottom diagrams *Frontage*

Side Street Growth. The streets around Suburban Centers near residential neighborhoods must be pedestrian-friendly, with an integrated network of sidewalks, covered areas for rain protection, and limited parking to discourage driving from one store to another. Parking lots could be made smaller and the pedestrian environment expanded, so people are encouraged to walk between buildings. Buildings should connect to surrounding streets via walkways for easy access to public transit.

Major HOV and transit vehicles should have direct access to the heart of this retail development. Transit stops too far from major shopping, or not connected by safe sidewalks, are likely to discourage riders. Ideally, drop off and waiting areas should be active, pleasant places offering such amenities as coffee vendors, newspaper stands, sundries, post office, dry cleaners, cash machine, and day care.

Coordinated or Specialized Retail Centers. Similar types of retail shops could be grouped together for ease of access on foot. The automobile center is one example of a central location where several auto dealers or suppliers join together in a sales center, or mini-mall. Similar patterns are emerging in furniture, appliances, and home repair markets as well. (See Photo 2.10)

Photo 2.10

Access for Pedestrians. Alleyways and internal walkways should be developed to create a network of through access opportunities for pedestrians. Many residents live near 99, and with the addition of safe walkways, access to HOV and daily services would be possible. (See Photo 2.10)

Increasing Residential Density

Most suburban neighborhoods offer excellent opportunities to increase density without dramatically changing the character of the community. Adding small granny flats in the rear yards, converting garages to apartments or subdividing larger homes as current residents need less space could double or triple the density without much visible change to

the neighborhood. With new sidewalk connections to Highway 99, most residents of these smaller, accessory units could live without the aid of a car.

Land in the immediate vicinity of the Suburban Centers could be zoned for high-density apartments, so that residents could have easy access to shopping, transit and ride-sharing and, for some, work. (See Photo 2.11)

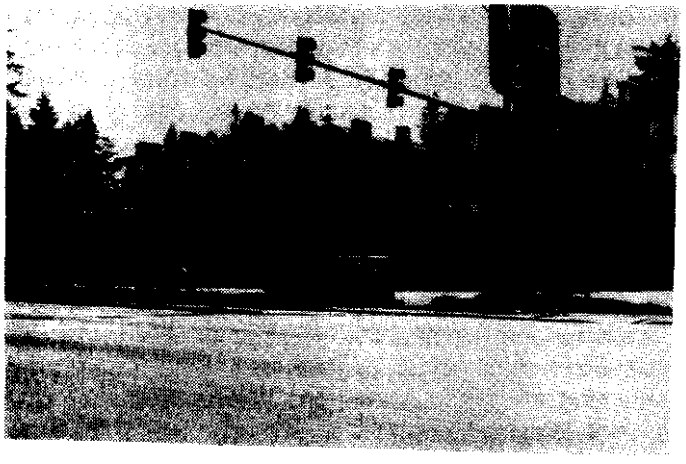


Photo 2.11 Many new apartments parallel 99, though they are separated by grade change, poor sidewalk, or fences from shopping, work or access to HOVs.

Increasing residential density would provide the additional users needed to support Suburban Centers and a non-express HOV lane. The HOV lane itself would help address one major complaint about increasing neighborhood density, that is, the perceived parking problem. If most of the new roomers and apartment dwellers used public transportation, walked or rode bicycles to shop or work, the need for additional parking would be dramatically reduced. (Chapter 3 illustrates how this might work.)

Between Centers. Non-automobile-dependent uses, such as apartment or office buildings, should be encouraged between Suburban Centers. Auto entry would ideally be from side or rear streets rather than from Highway 99. Few driveways would allow the HOVs to travel at up to 35 mph. Pedestrian entries should be from both Highway 99 and the side or rear street. Apartment or office site planning would organize parking so it was detached from the units, perhaps in garages, encouraging residents to walk rather than drive.

Highway 99's streetscape would include a wide sidewalk separated from the street with a planter strip. Street trees and planting would help integrate the offices or apartments. With few driveways, the median strip could be planted, further enhancing the roadway.

Section 3

Converting Existing Land Uses to Support HOV's and Pedestrians

Introduction

This section will analyze several existing land uses to determine where HOV and pedestrian design linkages will work and not. Since there are very few opportunities to walk in the study area, the section offers suggestions to improve conditions for pedestrians within several typical existing land uses. The major physical planning characteristics conducive to lessening automobile dependency are:

- centralized land uses, and
- better performing public transport
- more intensive land uses
- orientation of transport to non-automobile modes
- restraint on high speed traffic flows

Over the last 40 years, as automobiles replaced street cars, the need for locating houses close to the streetcar stop disappeared. Retail business concentrated near the streetcar stop began to spread out randomly along the principal roads, as did residential subdivisions and apartment complexes. Narrow-fronted shops typical of pedestrian-oriented districts were replaced by wider-fronted stores set back from the street behind wide parking lots. Curbs and sidewalks, symbols of a pedestrian and streetcar-oriented world, became expensive and unnecessary features in this new, low density environment. House lots became wider to accommodate garages, and houses themselves were set back from the street to reduce the noise and nuisance of passing cars.

The wide lots, wide streets, absence of sidewalks, scattered auto-oriented shopping that we associate with suburbs make ridesharing difficult today. The common ridesharing pattern is for suburban residents to leave home via their car, drive to a park-and-ride lot adjacent to a freeway, where they are picked up by a bus or van pool. An alternative, reminiscent of the streetcar model, would have residents walking from their home to a major arterial where they would be picked up by a bus, van or private automobile.

To accomplish that requires several or all of the following:

- Sidewalks on streets leading from residential neighborhoods to the HOV lanes.
- Wide sidewalks along the main HOV streets.
- Increased density in the residential communities to support bus and ridesharing.
- Readjustment of merchandising at the major intersections to serve pedestrians.
- Land use changes between intersections to reduce auto dependent retail activity.

Increasing density is the singlemost effective way to reduce travel. Compresing more use on each site, through taller buildings, greater land coverage, etc., reduces the amount of ground travel needed to get there and to travel around there once you have arrived. Feet, stairs and elevators replace vehicles.

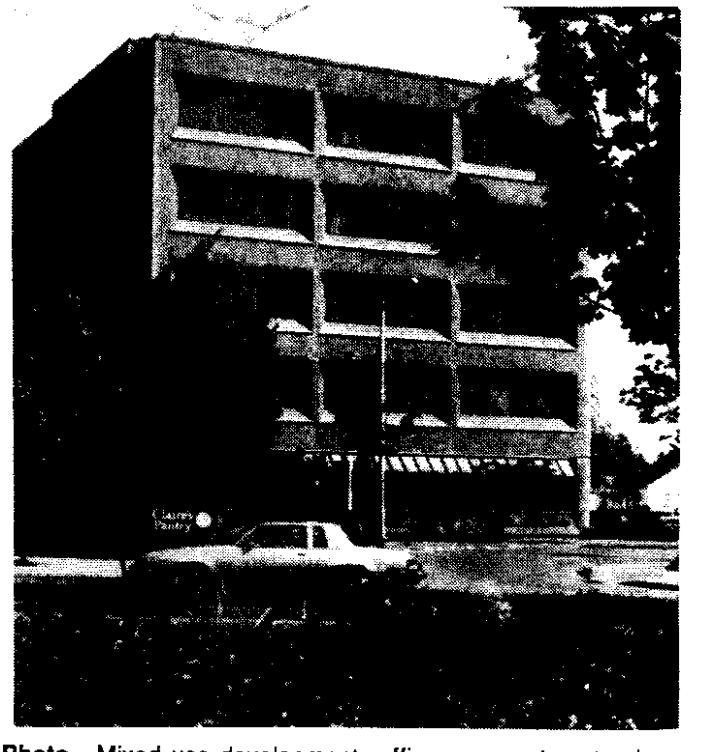
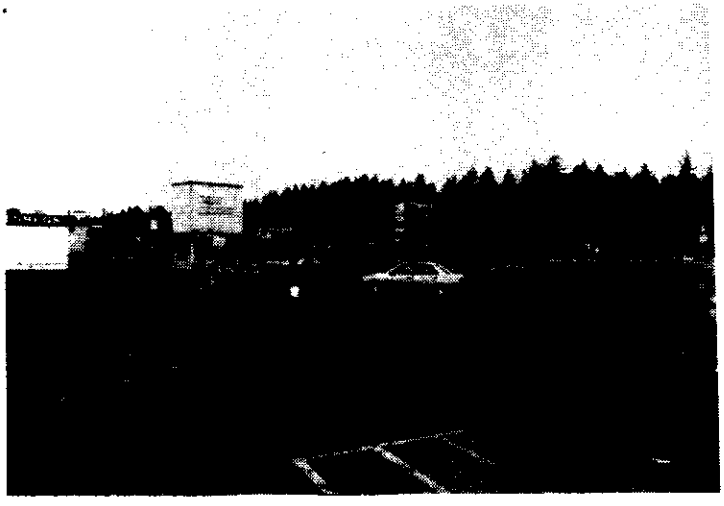


Photo. Mixed use developments-offices or apartments above shops to increase density and minimize the distances necessary to travel is an essential part of converting for HOV paratransit

Case Study Examples

The following case study examples illustrate how various land uses could be converted to better serve HOV and Pedestrian transportation needs - linking Land Use and Transportation.

The examples include converting large retailers on selected intersections to Suburban Centers, and options for converting auto oriented services to serve both cars and pedestrians.



Converting Shopping Centers to "Suburban Centers" Case Studies

The typical suburban shopping centers, which include different scales of retail, from the mall or subregional mall at the larger scale to the strip mall or stand-alone retailer at the smaller end, exhibit many characteristics which are unfriendly and uninviting to pedestrians and transit customers. All are too automobile oriented, offering easy access to the customer coming by car. For others, access to the store entrance from the street can be difficult, awkward and even unsafe.

In general, the retail buildings are set back from the street an average of 300 to 500 feet. Large surface parking lots are typically situated in front of the store, with little attention given to safe pedestrian access from the street. Most parking lots have multiple entries, allowing vehicles to come from several directions, creating confusion and safety problems. Surface lots are typically barren, with little or no landscaping or pedestrian safe meridians. Parking lots of adjacent uses are often separated by curbs, fences, and other barriers making connection between stores difficult for pedestrian and automobile users. Transit stops along the primary street are often inadequate in terms of shelter and proximity to retail.

Smaller strips usually offer an incomplete range of services, so tend to be bypassed by nearby residents in search of larger, more complete retail centers. In a similar manner, strips are often disconnected from other needed services, reinforcing the need for automobile use. Store design is often linear, with no pedestrian focus and offering little protection to pedestrians from vehicles. Storefronts, often set far back from the streets beyond barren expanses of parking, are visually uninteresting to potential foot traffic.

Shopping malls exhibit many of the same negative characteristics of the smaller strip malls, only on a larger scale. Parking lots which usually surround the mall on all four sides are enormous, consuming a great expanse of land. Mall entrances are often unclear and ambiguous, and pedestrian access from transit stops is particularly difficult. Typically the mall orientation is inward, with little regard for the outward streetscape. On the positive side, once inside the mall, the scale is completely oriented to the pedestrian.

Renovating existing shopping and strip malls towards pedestrian friendly use may not be easily accomplished overnight, but as land and energy become more expensive, the need for greater efficiency will help spur the needed changes. New retail developments can be designed from the outset for better accommodation of the pedestrian and transit users. Some basic goals and principles for achieving a better integration of land uses which serve pedestrian and transit needs can be stated as follows:

Site Access — Maximize public transportation and pedestrian access to the site. In essence, this means providing comfortable bus stops and shelters where possible with pedestrian connections to the main buildings. Pedestrian access between stores and adjacent sites should also be provided, which might require some coordination between different landowners. Fencing and landscaping should be designed so as not to create barriers to pedestrian or transit users. Access should be safe even for the elderly, the disabled, and small children. Transit stops and pedestrian dropoffs should be located within a reasonable proximity of building entrances.

Building Locations — Orient buildings toward public transportation facilities and not parking lots. Buildings need to be as conveniently situated to public transportation as they are to parking lots. Arrange buildings on the site to reduce walking distance between each of the buildings and between the nearest transit facility. Provide covered walkways around and between buildings if possible.

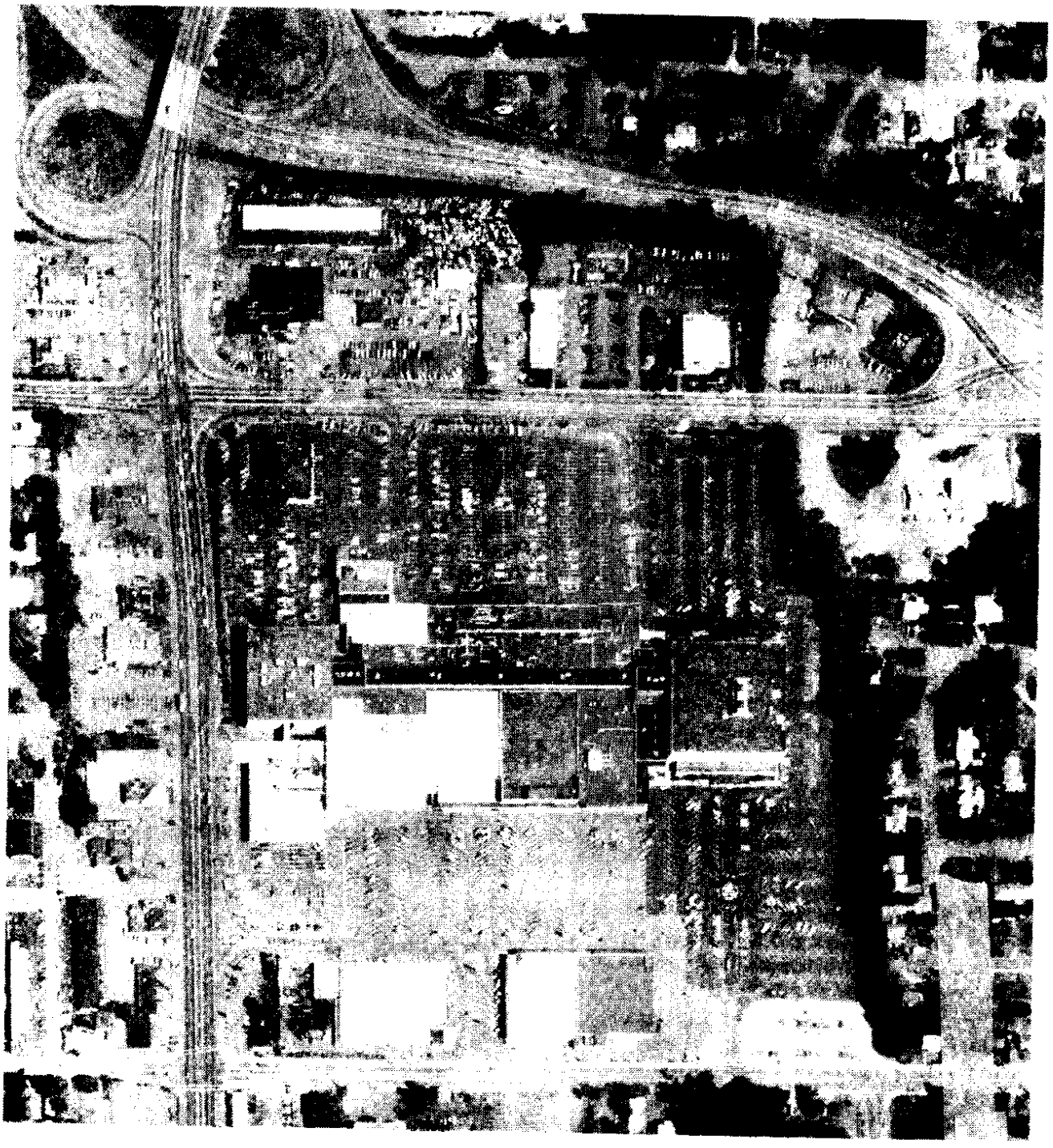
Increasing the density of existing retail sites is possible with addition of added levels of retail, new retail buildings in existing parking lots, offices or multi-family housing around the perimeter.

Parking — The goal is to encourage alternatives to the single occupant vehicle, as large free parking lots typical of the suburban shopping centers only encourage auto dependency. Existing lots can be retrofitted to be more pedestrian friendly, with the addition of meridians, landscaping, and covered walkways where appropriate. New parking lots should be located on the sides and to the rear of buildings, with major retail being situated closer to the street.

Circulation — Distances to bus stops from building entrances should not be more than 750 feet, and ideally should be much closer. All buildings on adjoining land uses should be connected with walkways where possible. Pedestrian/auto conflicts can be minimized by creating safe pedestrian pathways and crossings, and consolidating driveways and curb cuts. Roads and parking can be separated from pedestrian pathways by a grade change or other devices to increase safety.

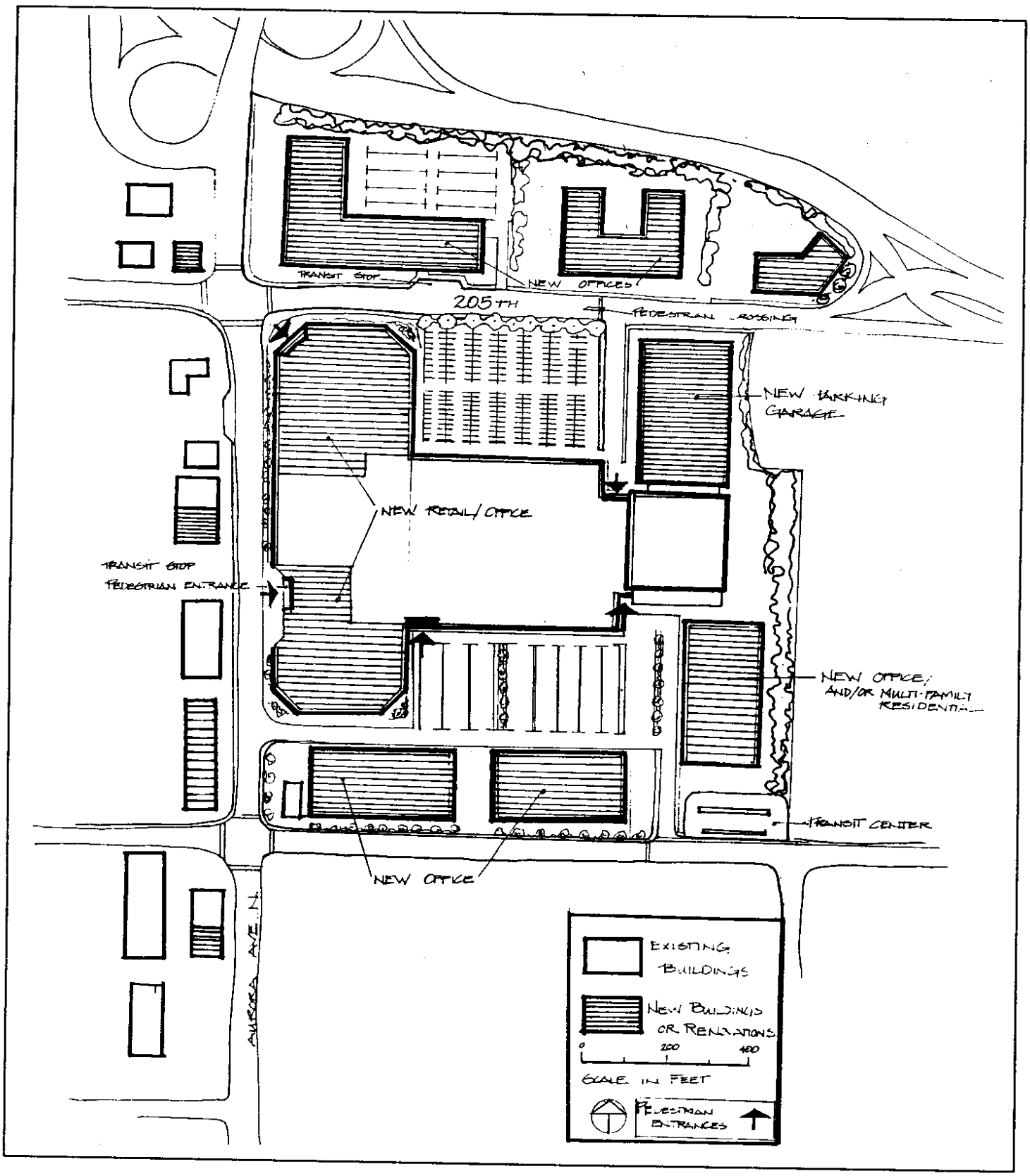
Aurora Village Site--Existing Conditions

205th and Aurora Avenue North



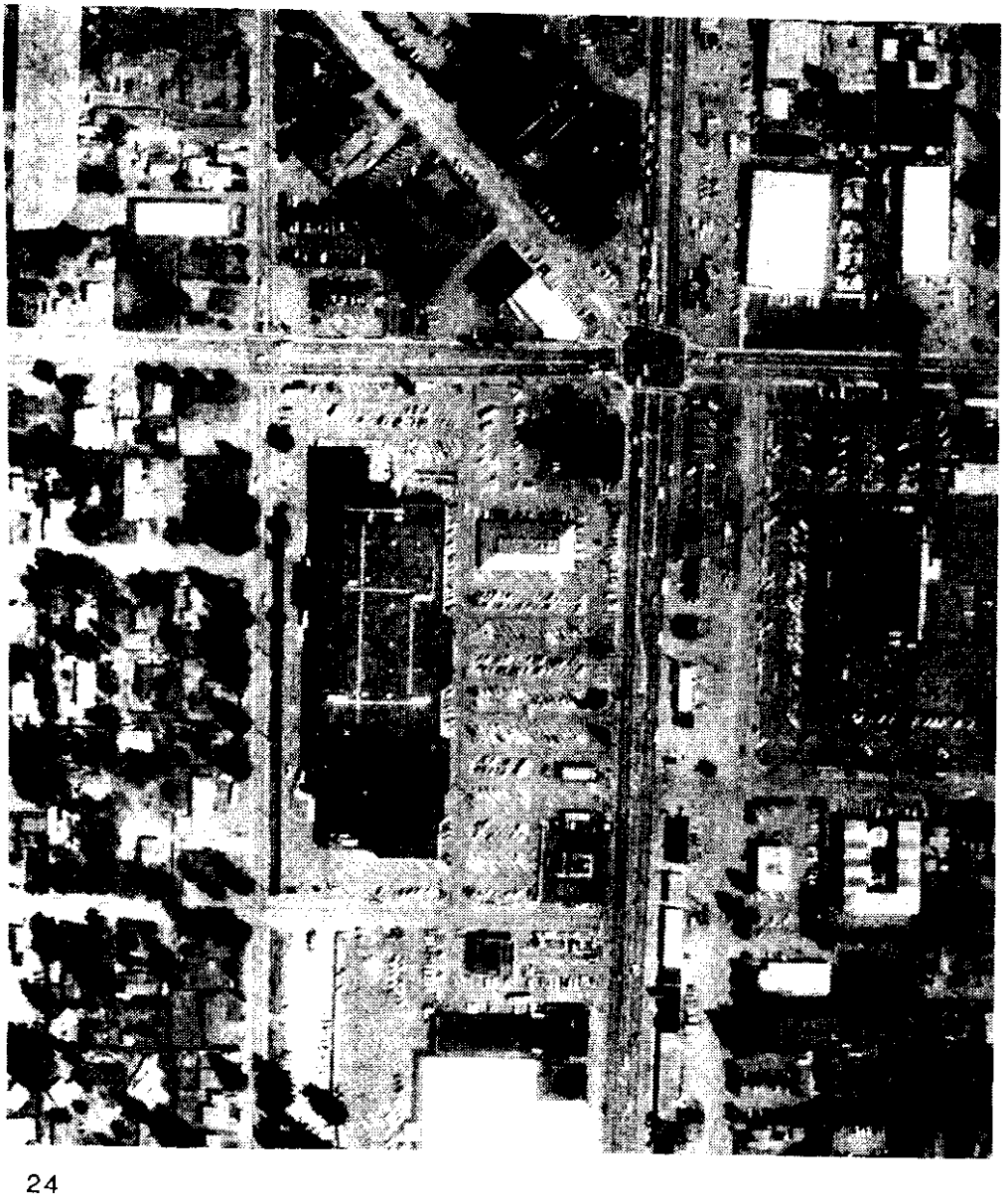
Suggestions for Improvement to the Aurora Village Site

Plans for a renovation of the existing Aurora Village Mall are underway, but have not been finalized. This plan illustrates general improvement concepts that would link land use and transportation to better serve pedestrians and HOV's. The changes include expanding the buildings to the street, creating clear pedestrian entrances, and widening the sidewalks so that pedestrians can easily reach the entries. Density of the overall site would be increased with the addition of new retail and office space in the center portion, and offices /apartment spaces bordering on the perimeter of the site. The site just to the north of Aurora Village is a prime area for new office facilities, with orientation to 205th and parking behind or on the north side. A mid-block pedestrian link would be established on 205th to allow non-auto access from this site to Aurora Village.



Fred Meyer Site--Existing Conditions

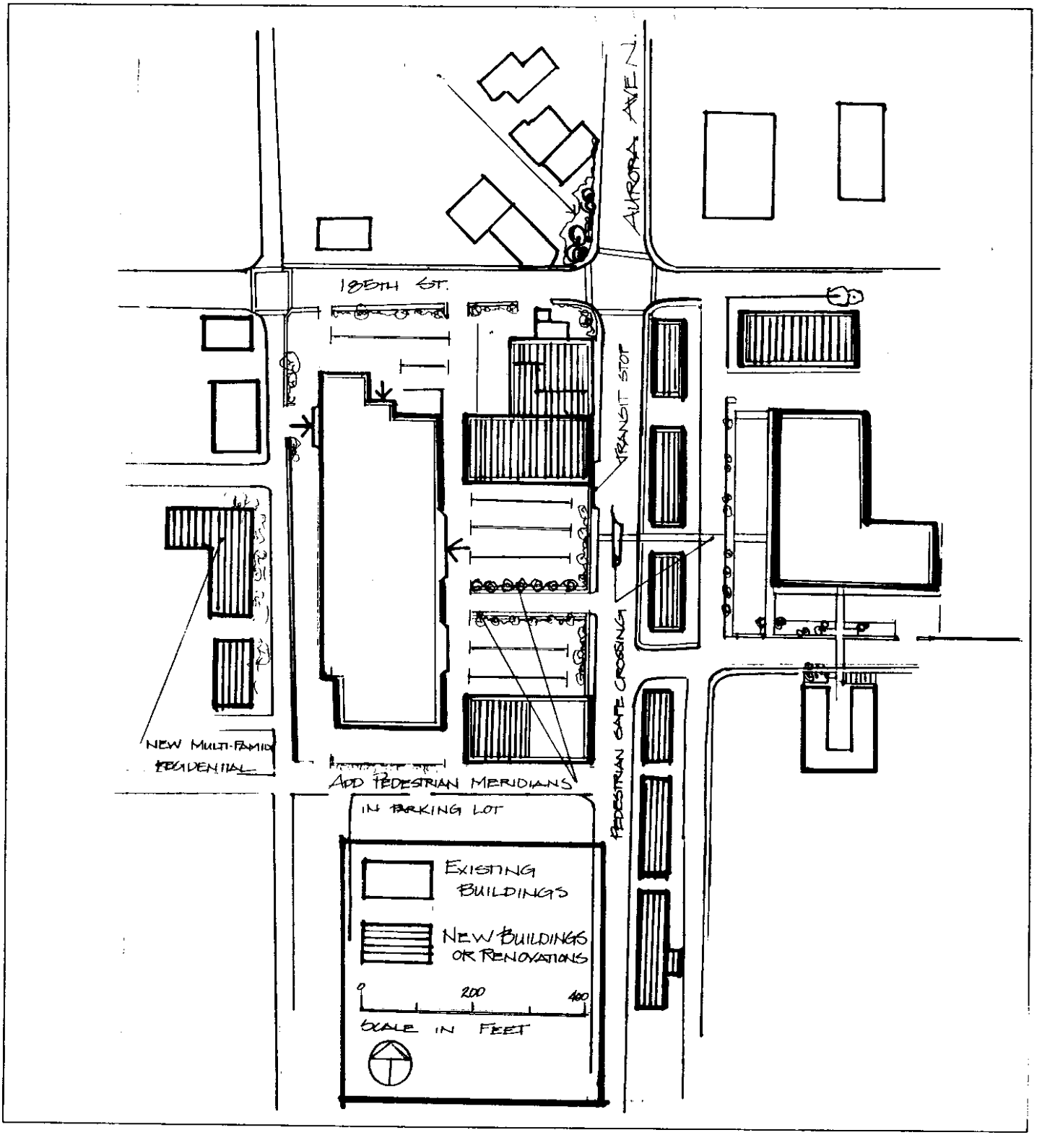
185th and Aurora Avenue North



Suggested Improvements for the Fred Meyer Site

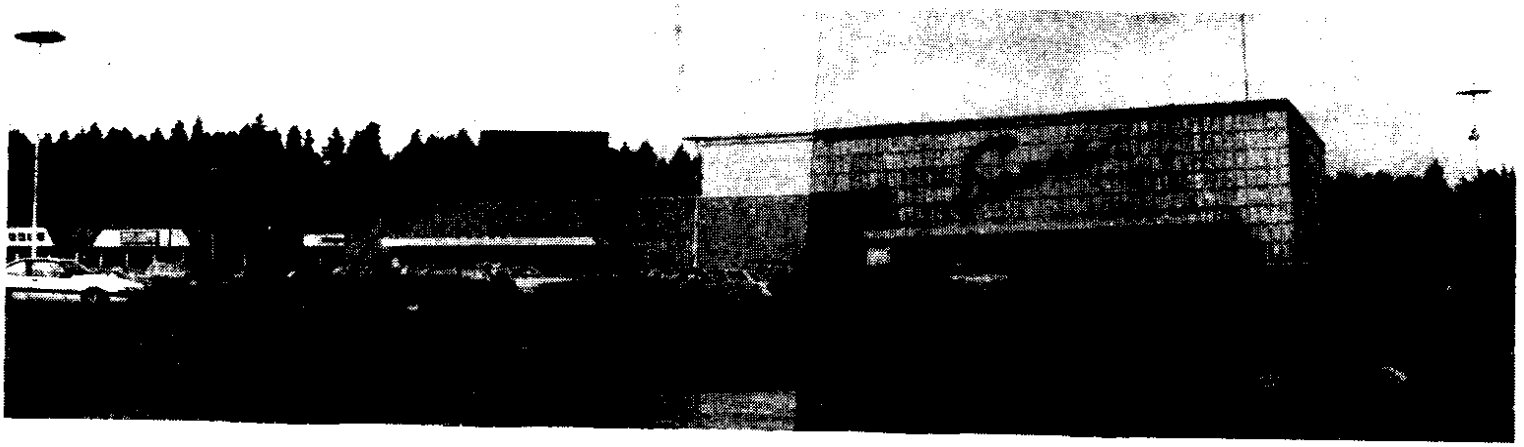
The Fred Meyer site exhibits a typical pattern of land use for large stand-alone retail uses along Highway 99. The main store is set back on the lot with an expanse of parking situated in front of the store.

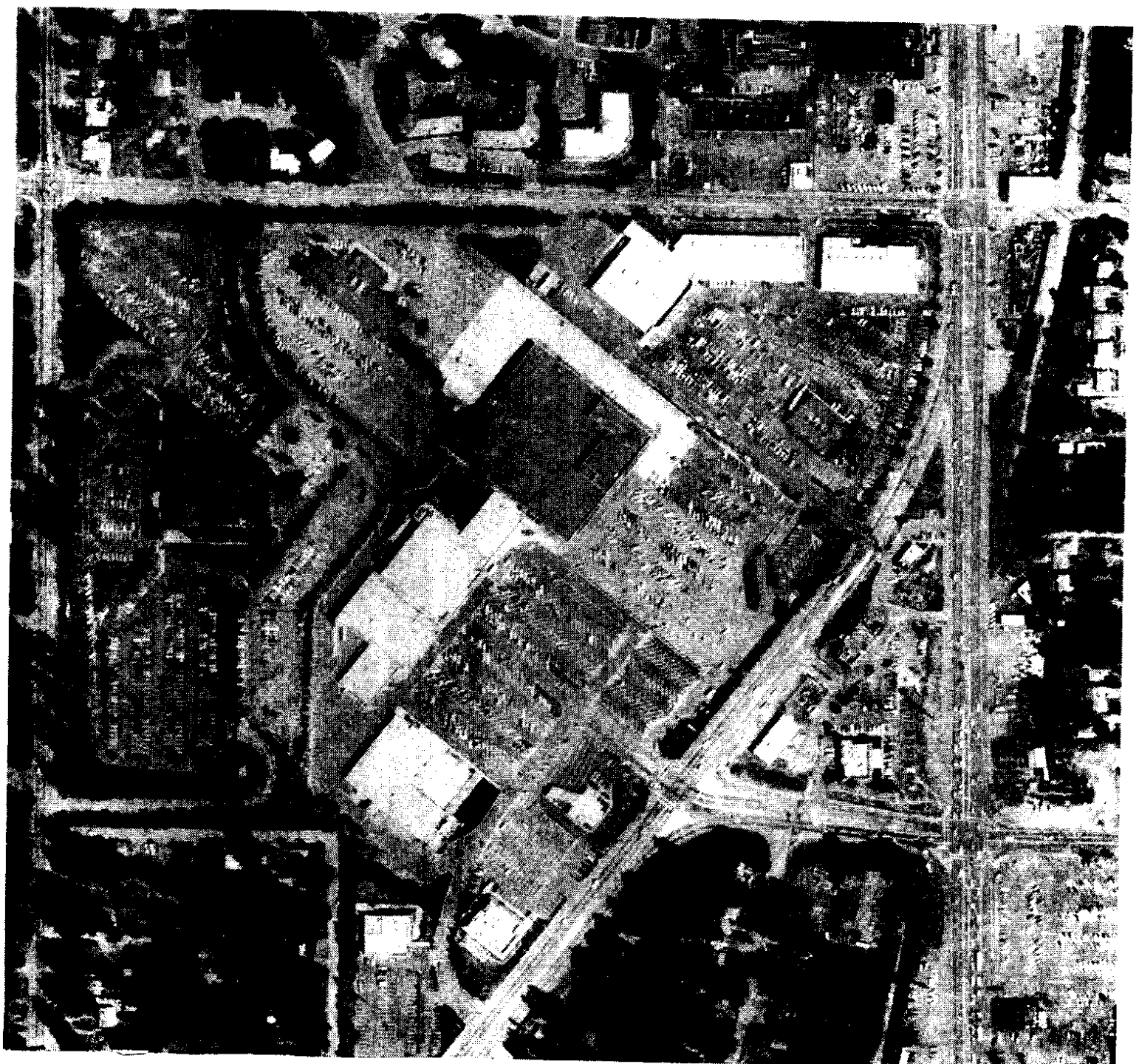
The plan shows new buildings and renovations of existing buildings which border the street, providing a pedestrian linkage to the primary retail use (Fred Meyer). The existing transit stop on Aurora is improved with the addition of a bus turnoff area and shelter. The sidewalks along Aurora are widened, and connect with pedestrian scaled meridians to the store entrance, providing a safer route through the parking lot. A safe pedestrian crossing connecting the Fred Meyer site to the east side is added, providing more direct access from the retail center and adjacent apartments on the east side of the street. As the density of this area increases, new multi-family structures are suggested around the perimeter of the site, with an entry being provided on the back or west side of the building for the convenience of pedestrian traffic from surrounding residential areas.



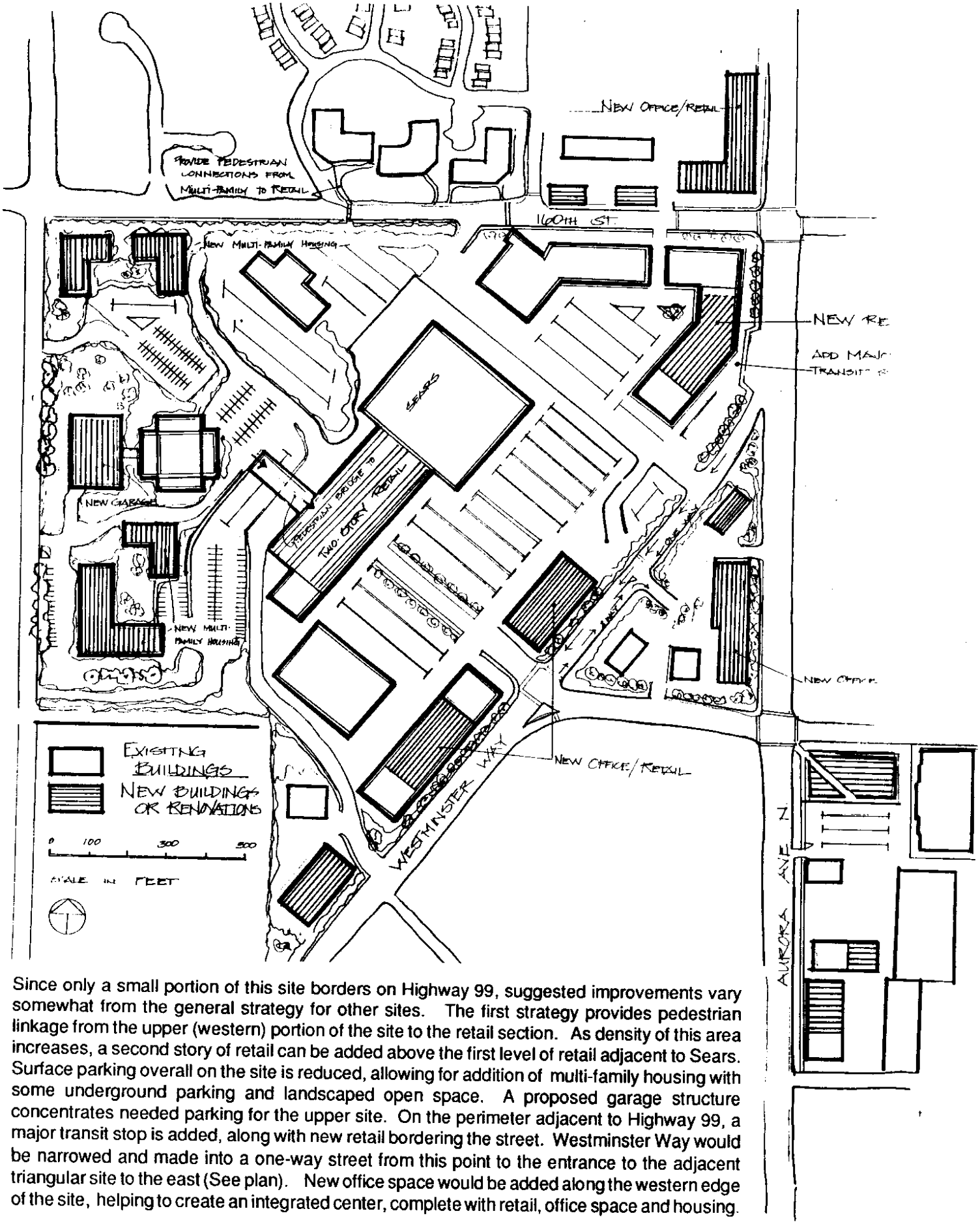
Sears Site--Existing Conditions

160th and Aurora Avenue North





Suggested Improvements to Sears Site



Since only a small portion of this site borders on Highway 99, suggested improvements vary somewhat from the general strategy for other sites. The first strategy provides pedestrian linkage from the upper (western) portion of the site to the retail section. As density of this area increases, a second story of retail can be added above the first level of retail adjacent to Sears. Surface parking overall on the site is reduced, allowing for addition of multi-family housing with some underground parking and landscaped open space. A proposed garage structure concentrates needed parking for the upper site. On the perimeter adjacent to Highway 99, a major transit stop is added, along with new retail bordering the street. Westminster Way would be narrowed and made into a one-way street from this point to the entrance to the adjacent triangular site to the east (See plan). New office space would be added along the western edge of the site, helping to create an integrated center, complete with retail, office space and housing.

Converting Intersection Uses to Serve Transit Riders

This case study explores four intersection land uses that might serve as HOV stops. Most of these intersections are not the scale of a Suburban Center, and are instead gas stations, mini malls, a large grocer or drug store, etc. Ideally the conversion to also serve as a transit stop requires provision of everyday essential services — grocery or drug, mail stop, bank, bookstore, food services and shelter.

Most gas stations and convenience stores located at busy intersections were inexpensively constructed near the rear of the property, with wide driveways off the arterial instead of a secondary or "backage" street. Drive through services like banks and fast food create an unfriendly and possibly unsafe environment for the pedestrian. Overabundant parking and poor pedestrian connections from transit stop to neighboring residential areas make transit use less comfortable and convenient. (See Photo Left)

The study also includes a large grocery store located at a busy intersection with deep setbacks, far too much parking front of the store, and no pedestrian amenity to speak of. This is typical of a number of large grocery, drug or warehouse shopping where the parking lots can be unsafe, lacking sidewalks, crosswalks and landscaping, which could help break up the visual monotony. Pedestrian access to neighboring housing and shopping is difficult due to lack of pathways and crosswalks. Street lights do not give pedestrians priority, and the signage and buildings are scaled for high speed traffic. The streetscape is unpleasant for those on foot or riding a bicycle. (See Photo Below)

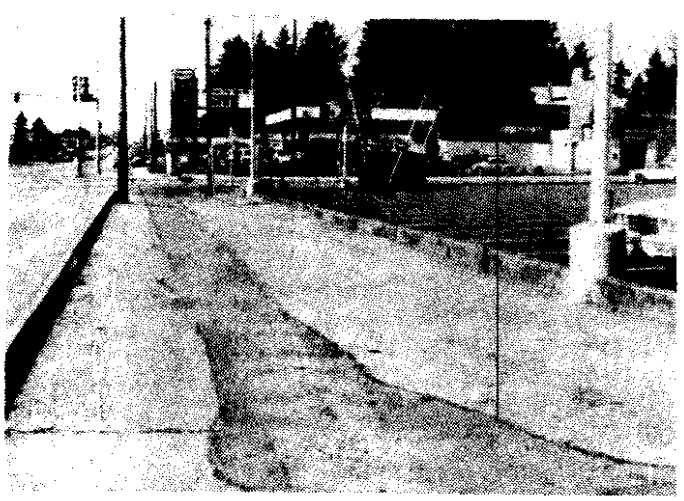


Photo. Most street edges along large merchandisers is paved drainage ditches, crisscrossed with barriers that make walking unpleasant.

The following examples show several ways to make these land uses more workable for transit and for HOV users. One or all of these suggestions may work for any given location.

Photo. Stores constructed away from the street make foot access to shops and services difficult and uncomfortable. Construct new shops in the parking lots to 'bridge' the distance. Add apartments in the rear to reinforce the shopping district.

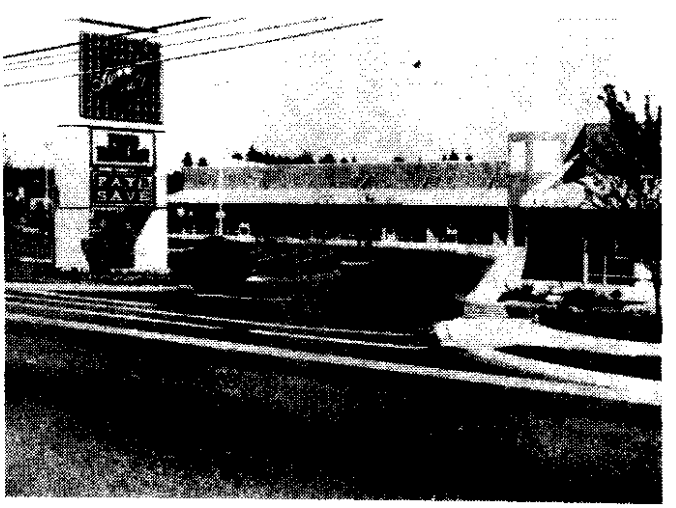


Photo. Several newer shopping complexes are 'reaching' to Highway 99 with a grid system of streets, sidwalks and street trees. The walks are wide, and covered with awning, so shoppers can walk from store to store rather than drive

Case Study 1 Create Positive Corners

Existing Conditions. In this example the deep building set back from the street creates a "negative" corner. There is too much parking and too many driveways, and not enough building. Lack of sidewalks makes pedestrian access to nearby residential areas difficult and no pedestrian protection from the busy arterial is provided.

Suggestions for Improvement. A "positive" corner could be developed by adding a building along the street to densify land uses and create an interesting, slightly more vital street next to the HOV lane. One driveway could be eliminated, and a planting strip developed between the arterial and the sidewalk to protect pedestrians. All sidewalks should continue across driveways and between buildings.

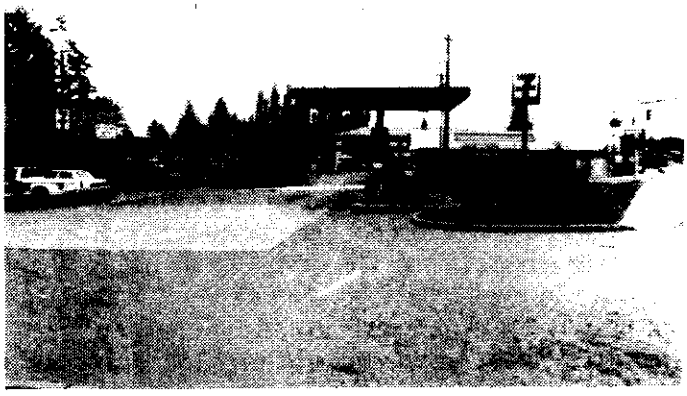


Photo Right Above. Service stations often have parking lots which are too large. Additional buildings added to the corner will have a better street face. Driveways from the main arterial should be eliminated or changed to "backage" streets.

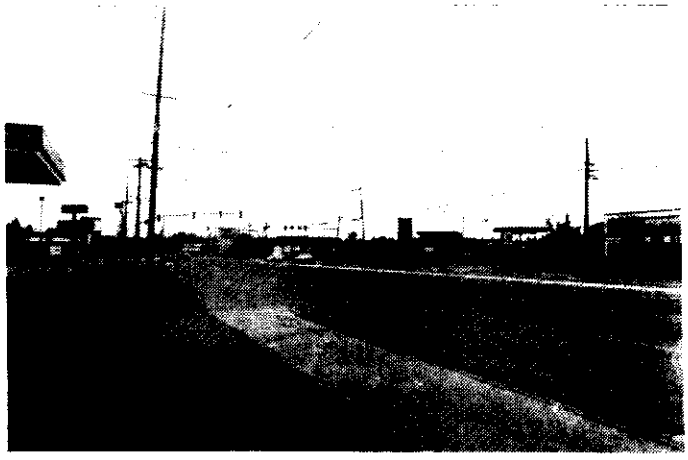
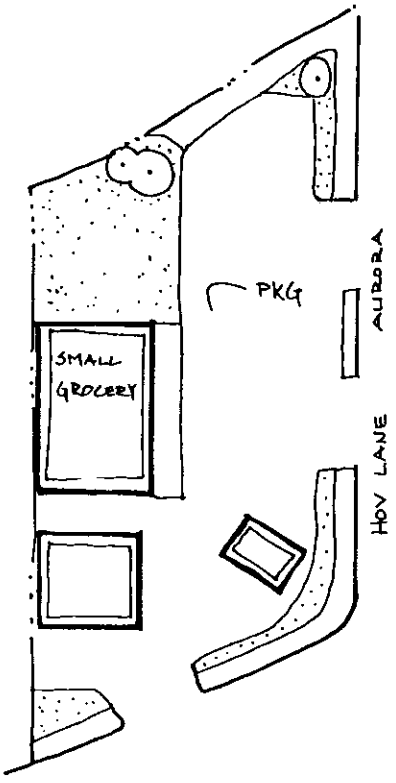
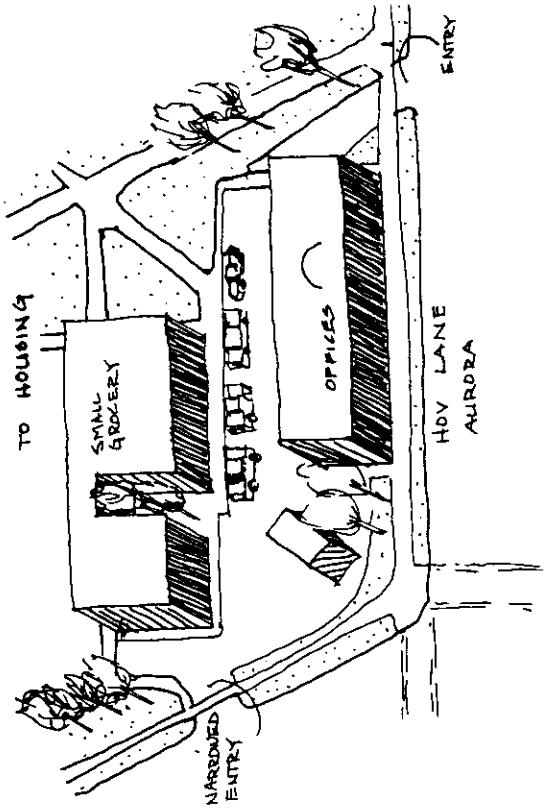


Photo Right Below. Pedestrian connections need to be added to provide for access to and from the HOV waiting area.



Existing Conditions (Plan View). Most of the land is used for parking, buildings are set to the rear of the property, and most of the street is continuous curb cut driveway.



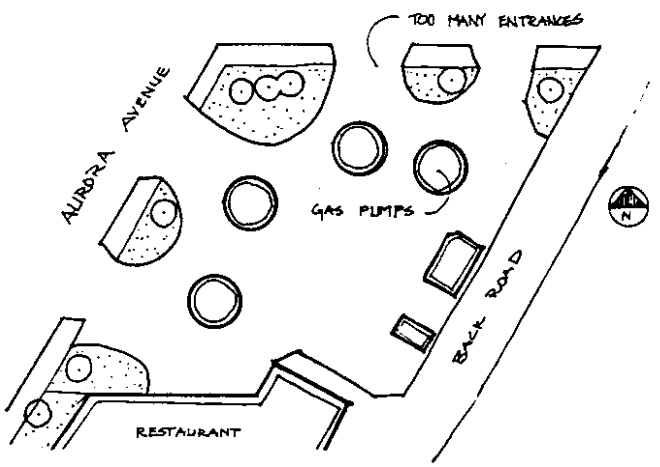
Suggested Improvements (Isometric). A new building lines the street, sheltering a parking courtyard. Driveways along Highway 99 are reduced in size, and sidewalks and walkways added.

Case Study 2 Gas Stations— a 24 Hour Transit Stop

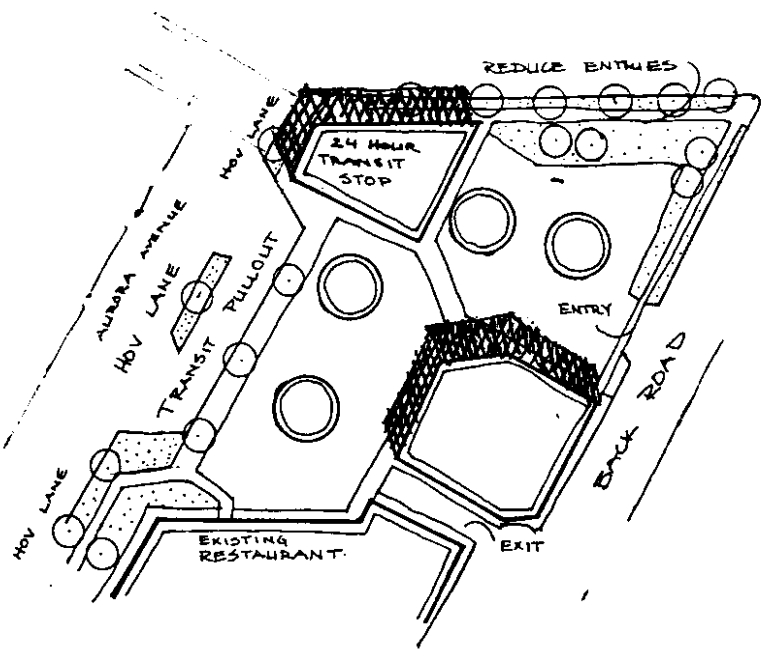
Many intersection gas stations can serve as both transit stop and gas station, affording 24-hour protection, food, resting, and other services to ridesharers and drivers alike. The study participants felt that service stations could be less land consumptive since they seldom offered the traditional 'services' of the past—yet they were still operating on the large lot size of past times.

Existing conditions. Gas stations often occupy prominent locations at the intersection, and this creates many problems for the pedestrian. The drive-through nature of gas stations and large driveways interrupt the HOV lane flow and hinder bicycle or pedestrian traffic. Usually no attempt has been made to provide walks to neighboring services or residential areas. On the plus side, many gas stations are open 24 hours, are well lit, and offer light food and grocery items for sale.

Suggestions for Improvement. Existing gas stations may have enough space for transit pull outs and a building for transit services such as food or magazines and waiting area protection from the rain and cold. Other solutions include eliminating some of the driveways and adding sidewalk connections to all neighboring areas. A landscape planting buffer along the arterial and sidewalk connections across driveways and from one building to another helps make it pedestrian friendly.



Existing Conditions (Plan View) Gas stations and convenience stores are typically located at busy intersections with extensive driveways off the Highway.



Suggested Improvements. Organized land use can provide space for a para-transit station without losing visibility and business. Intensifying the services should help pedestrians, HOV users and the vehicle drivers.

Case Study 3 Reuse Large Grocery Store Parking Lots.

Existing Conditions. Large grocery stores and discount centers often stand alone surrounded by large parking lots, unsafe and inconvenient for pedestrians (See Photo Right). These stores have exaggerated setbacks and little or no connections to the neighborhoods. Walking is difficult because there are no crosswalks or marked pathways. Nearby street lights give little pedestrian priority.

Suggestions for Improvement. Add buildings at the corner to intensify land use and build a friendly pedestrian edge. Create internal and mid-block crosswalks to the adjacent residential street. Improve pedestrian connection to neighboring uses. Use the parking for more than one building and more than one time of day by including movie theaters and restaurants. Pedestrian connection to the HOV lanes should be obvious and easy.

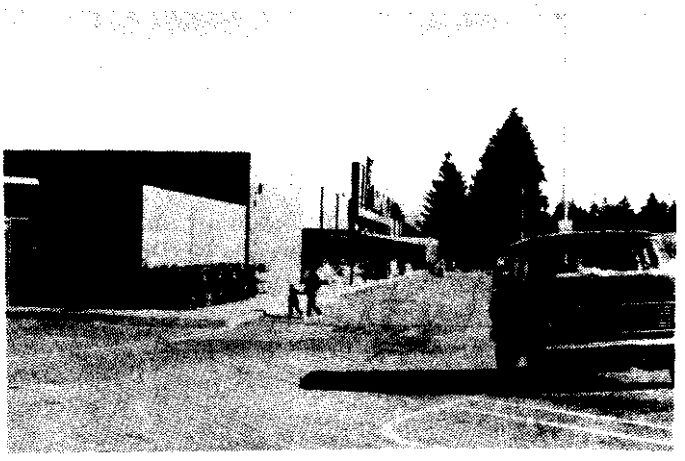
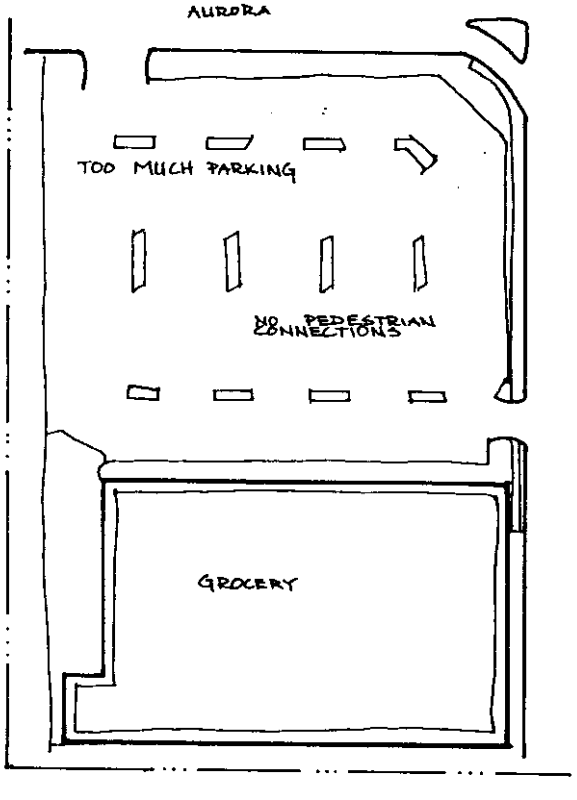
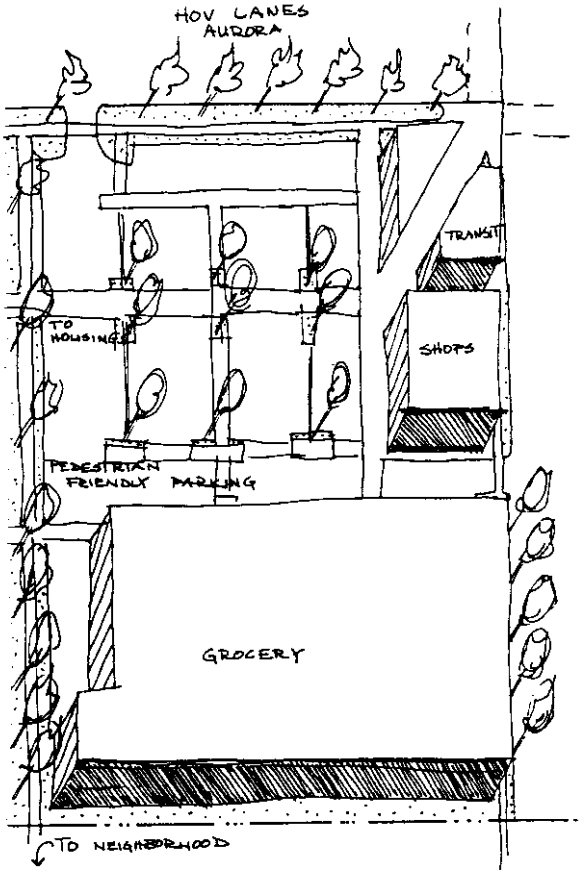


Photo. Narrow walkways that end abruptly are typical of large store layouts. Ideally they should be connected to the street and to other stores or apartments for safe access on foot.



Existing Conditions (Plan View). Stores with extremely large setbacks make pedestrian, HOV, and bicycle use difficult. Single use shopping encourages the over use of the automobile.



Suggested Changes. Adding new services and stores in the parking lot creates multiple shopping opportunities and cuts down on the number of daily trips. New stores should connect to the street with covered walkways and window shopping opportunities. Sidewalks and pavement striping can help pedestrians get through safely.

Case Study 4 Mini-Main Street With A New Grid System.

Many newer suburban mini malls have several buildings randomly located among several parking lots. Organizing the buildings so that both automobiles and pedestrians can safely use the services can be reasonably accomplished. Buildings which are currently auto dominant should benefit from increased pedestrian activity.

Existing Conditions. Scattered auto dominant buildings make foot access between them difficult (See Photo). Drive throughs create unfriendly pedestrian environments. Too much space is left for parking and there are no connections for walking from building to building or to the residential areas beyond. Large driveways off of Highway 99 slow the HOV flow.

Suggestions for Improvement. Create an internal pedestrian grid which links all the buildings allowing drivers to park once and shop at many places. Transit users could shop before or after work and enjoy protection from rain and cold while waiting for their ride. Add buildings along the arterial to replace parking, create internal crosswalks, remove one entry off the arterial, and remove the drive through and some parking to build a 24 hour transit station. Provide a park-like area for food services or resting.

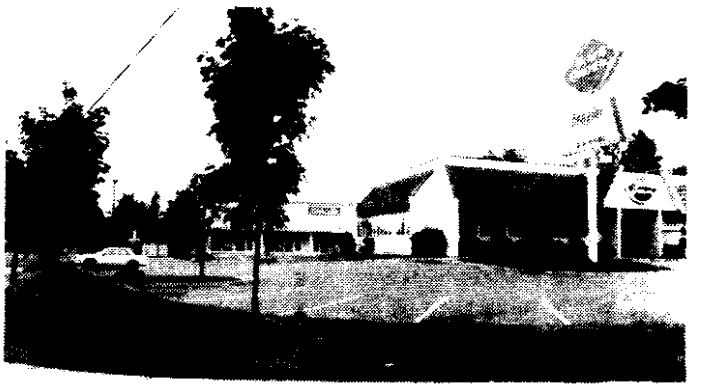
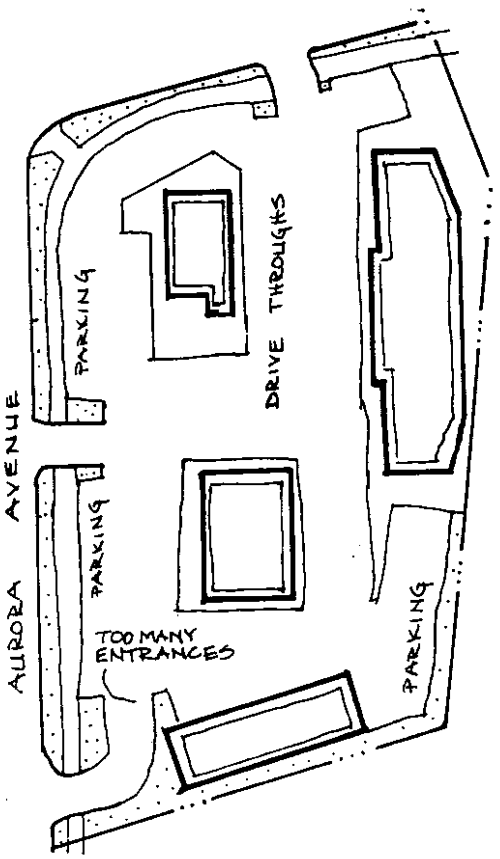
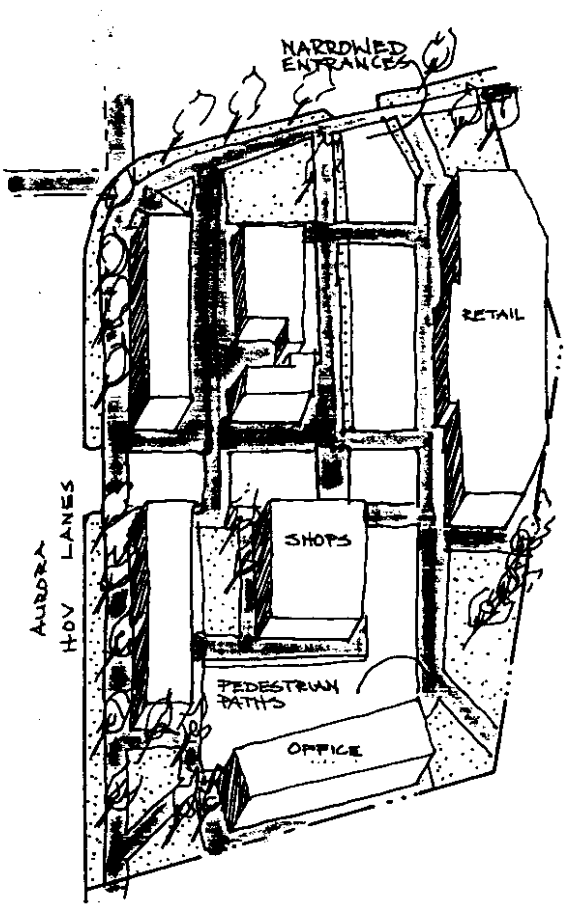


Photo. Large parking lots, buildings set back from the sidewalk and drive through services are still typical in many newer complexes.



Existing Conditions (Plan View). Drive through services are unfriendly for pedestrians and parking lots are too large. Connections between neighboring uses are inadequate and driveways that enter off the main arterial slow HOV traffic.



Suggested Improvements (Isometric). Planting strips between the main arterial and the sidewalk provide safety for the pedestrian. Additional sidewalks should connect the stores and the neighborhoods beyond.

Apartment Complexes

Reaching Highway 99 on foot from most apartments is difficult because of lack of sidewalks, barriers to through connections such as fences or grade changes; and the presence and dominance of the automobile. The most convenient means of transportation for apartment dwellers is the car, which is generally parked within ten feet of the front door Presently, anyone who preferred walking would have to walk through a parking lot or on incomplete sidewalks exposed to traffic. (See Photo Below).

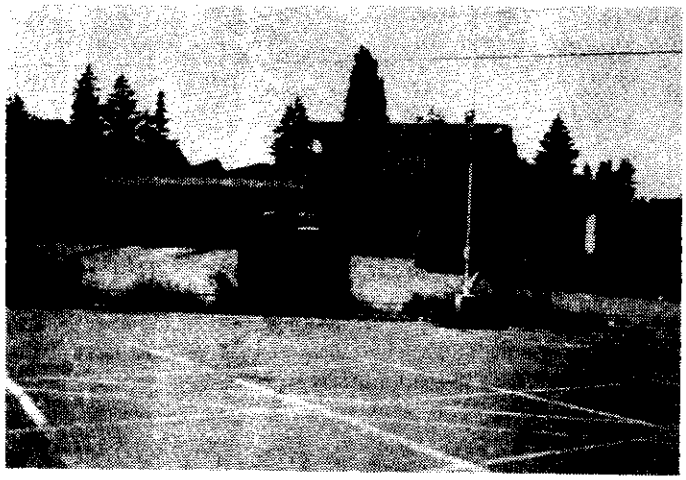


Photo. Parking lots serve as effective barriers against walking to or from most apartments.

Most larger suburban apartment complexes are isolated enclaves, separated from neighbors by fences and from the street by parking lots. In some adjacent complexes separate driveways are located side by side, separated by a fence or short distance (see Photo Below). Frequently, apartment complexes are laid out with housing units facing on an interior, park-like open space, while the roadway side is a parking lot. This layout is the opposite of the relationship of house to street in the old "streetcar community" where the street orientation and ample sidewalks allowed residents to walk to the bus or business district. To keep costs down, many apartment complex parking lots have no sidewalks and limited planting. Their location very close to front doors makes walking to the street inconvenient, unpleasant and often unsafe.

Photo. Driveways to seperate apartment complexes appear side by side, instead of shared as is typical in grid patterned developments. Foot access between complexes is impossible because of grade change, buildings or finces in the way, and general private property rights attitudes.

Adjusting Apartment Complexes

The solutions to convert existing, private apartment complexes to serve pedestrians are difficult and will require time. The principal technique is to construct a network of new walkways connecting all units within a complex to surrounding streets. Some cases may require public (or quasi-public) purchasing of specific land or cooperation among different landowners to link apartments more directly to street. Access from apartment developments to arterials could be achieved by providing gates through fences and connected walkways, possibly through existing parking lots. If a complex is located several blocks from the arterial, cooperation between different developments may be necessary to provide linkage.

Options to enhance pedestrian access in apartment communities include the following:

- Reducing the size of parking lots and installing sidewalks. Many parking lots were constructed in an era of larger cars and can be narrowed, freeing space for new sidewalks.
- Eliminating parking spaces as vehicle ownership decreases. With improved ridesharing, some apartment dwellers may not need a second car, providing space for pedestrian-oriented improvements.
- Removing fences between developments to encourage shortcutting. While continuous pedestrian linkage is important, preserving privacy for residents is equally important.
- Combining adjacent driveways and narrowing them to reduce the danger and inconvenience to pedestrians.
- Increasing density to support bus service—perhaps on land reclaimed from reduced parking needs.
- Constructing sidewalks on major arterials, separated from the street by a planter strip or extra width.

Apartment Complex Case Studies

The case studies explore four ideas to enhance pedestrian and hence HOV usage. Each will help to achieve a better environment for the pedestrian and lessen the auto dominance of its setting. The four ideas are to

1. Create new entry walks.
2. Create new streetscapes.
3. Connect apartment complexes
4. Reduce parking spaces.

In the illustrations below each idea is described first as the existing conditions and then as suggested solutions. These ideas, of course, can all be applied to any new developments or for improvements of other existing developments. Sometimes elementary changes can be undertaken for substantial results.

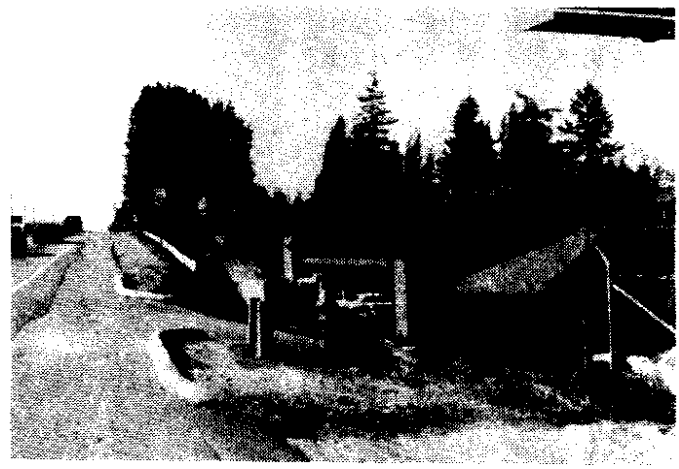
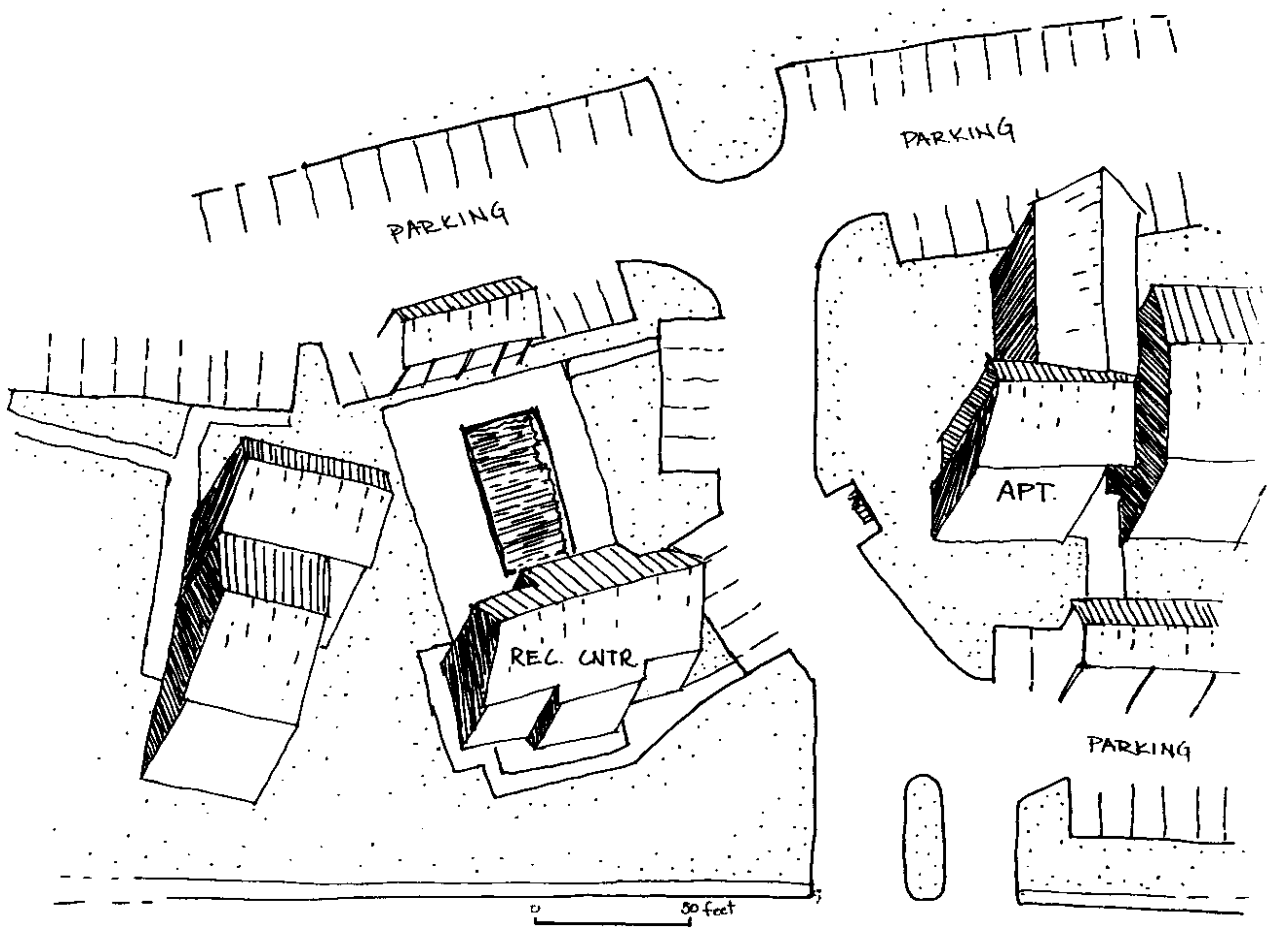


Photo Though many apartments are near Highway 99, they are hard to reach on foot because of lack of sidewalks and over dependance on the automobile.



Existing Conditions. Auto dominated developments make walking difficult. Lack of sidewalks within and connecting the development to the street make taking a car easier than walking.

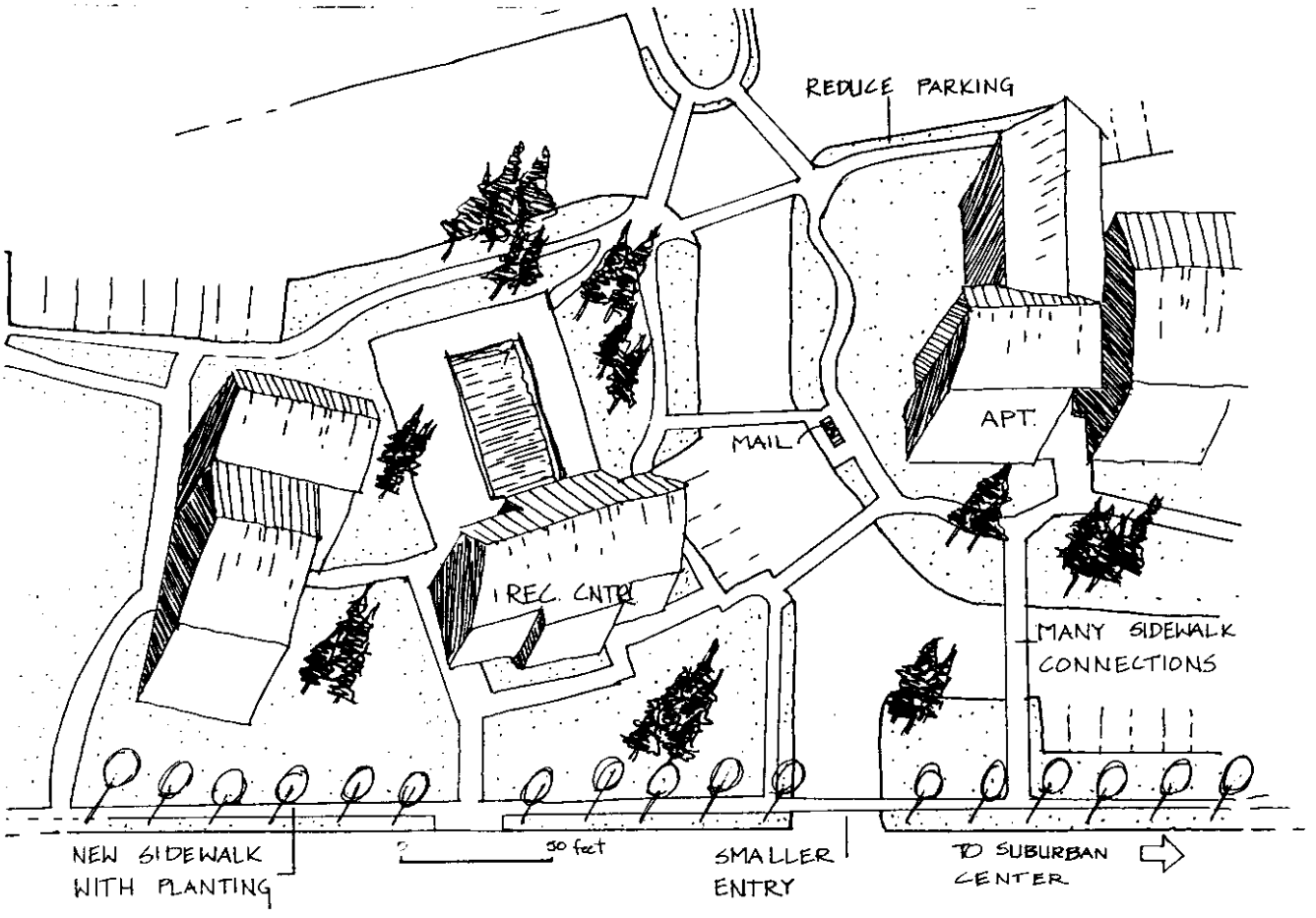
Example 1 Create New Entry Walks.

Existing conditions: New suburban apartment developments are often planned for maximun auto dependence rather than accommodating pedestrians. This has led to problems such as too much parking space, too wide streets, few or no sidewalk connections to main road, no sidewalks to mail boxes, etc. Many residents would have to traverse several parking lots to complete a daily mail box visit or to get to the office, or to reach the transit stop.

Suggestions for Improvement: For new communities, and existing ones, the pedestrian's safety should be the paramount concern. Everyone is a pedestrian once the car is parked. Safe passage on sidewalk connections is very important for safety and community building. Improvements can include the following: provide obvious and ample walkways and sidewalk connections, reduce roads and road widths, reduce parking and allow sidewalks to mailboxes.

Communities are often built around daily activities. Meeting one's neighbor at the mailbox or laundry room can help residents feel comfort and safety in their complex, as well as provide safety for children and the disabled.

Photo of existing entry condition. The exisiting landscape is auto dominated, consisting of wide parking lots with few walkways.



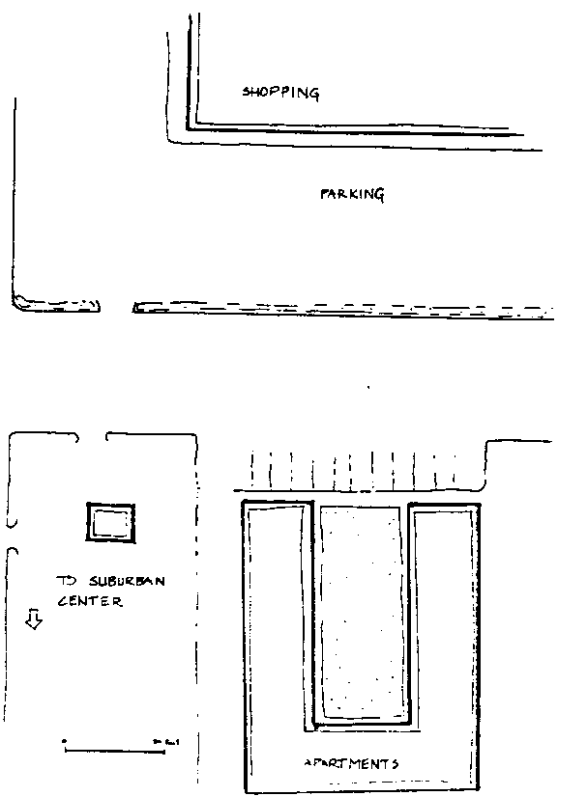
Proposed Changes. New walkways connect each apartment to the street and beyond to a HOV para-transit stop. With some residents 'ridesharing', several parking spaces can be removed, and the driveway narrowed.

Example 2. Create New Streetscapes.

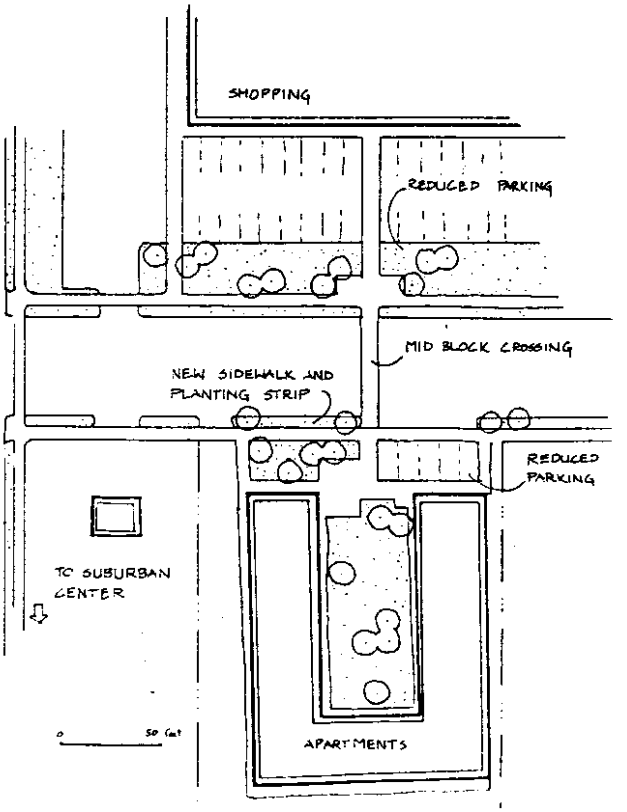
Existing conditions: Many apartment complexes are built with little attention to the look, feel and safety of the adjacent street (See Photo opposite). A sixty foot street right of way with no sidewalk or planting strip appears even wider when apartment parking is next to it. Sometimes the condition may be worsened when a strip mall faces the apartment across the street with another sixty feet of parking space. The resulting street is grossly overwide and provides no safe passage for the pedestrian either along or across the street.

Suggestions for Improvement: Streetscape improvements can be accomplished by reducing the amount of parking to create room for a small entry garden for the residents. On street parking next to an ample planting strip and sidewalk will allow more room for an entry garden area as well. Mid-block street crossings can often be organized to connect shopping to the apartment complex. Planting strips and sidewalks on both sides of the street will soften the expanse of parking asphalt at a strip mall. Raised sidewalks across driveways remind the auto driver that pedestrians may be present.

Existing conditions. The apartment is set back from the road by a 'head in' parking lot, making travel by foot difficult and unsafe for many. No sidewalk, curbs or planters exist.



Existing Plan. The 'head in' parking lot leaves no safe access for pedestrians either entering the apartment, or moving along the street. The parking lot across the street was without landscaping, further creating an image of auto dominance.



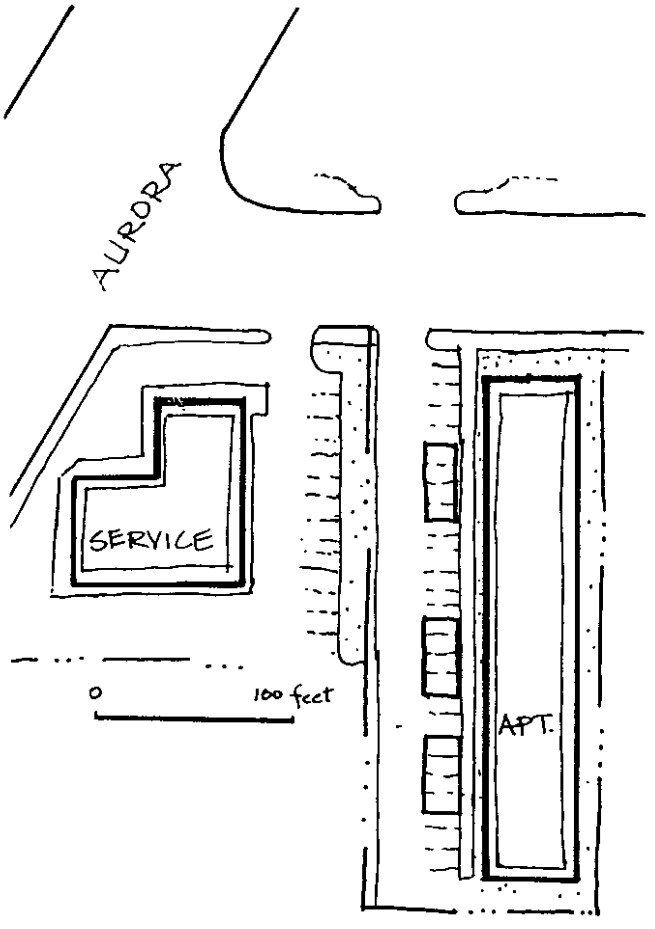
Proposed Changes. Reduce the overall numbers of parking spaces (through ridesharing) construct sidewalks and a planted entry. New sidewalks line both sides of the street, serving HOV and other destinations.

Example 3 Link apartment complexes to neighboring apartments and stores.

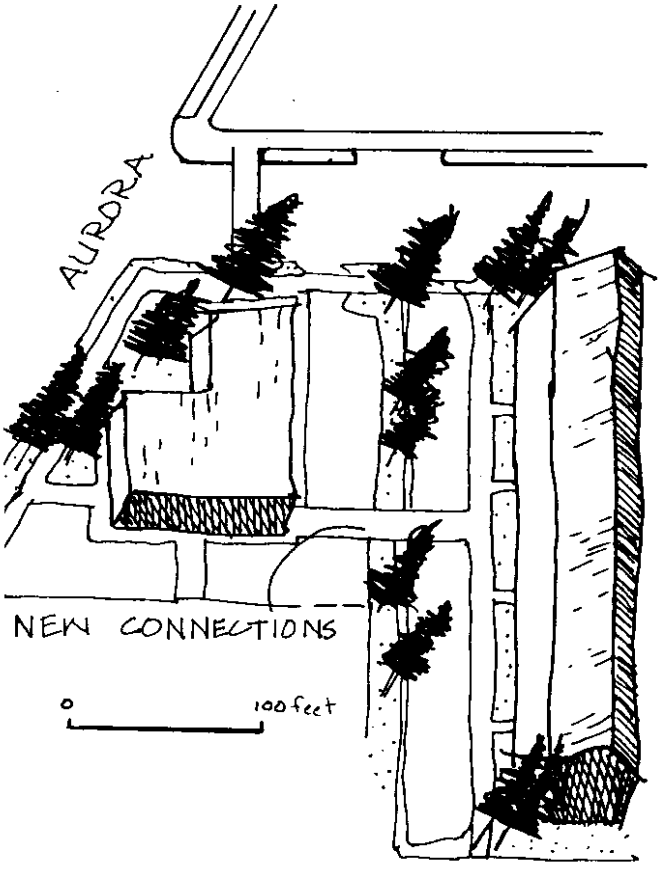
Existing conditions. Many apartment complexes are separated from neighboring shops or other apartment developments by fences and planting strips. Presently, access to the neighboring property is easier and safer by automobile even though it could be accomplished in a very short walk. Barriers which do not allow for easy passage inhibit simple daily activies like convenience store stops or visiting a neighbor. Unplanned "Cut throughs" can become annoyances to neighbors, but they need not be if properly planned.

Suggestions for Improvement. Create connections to neighboring services and apartments. Gates in the fences and sidewalks to the sevices can encourge the pedestrian. In some instances complete removal of several parts of a fence is desirable. In other cases unlocked gates would give the impression that not everyone is allowed. In cases where extreme privacy and saftey are the concern, lockable gates may be appropriate. This does, however, create the same problem as above if the pedestrian flow is overly curtailed.

Photo. Gates in fences and private walks through parking and entry walks can provide easy access through apartment complexes to shops and neighboring apartments beyond.



Existing Condition (Plan view). Barriers like fences, lack of walkways, change of grade and unfriendly parking lots prevent foot access to nearby shops.



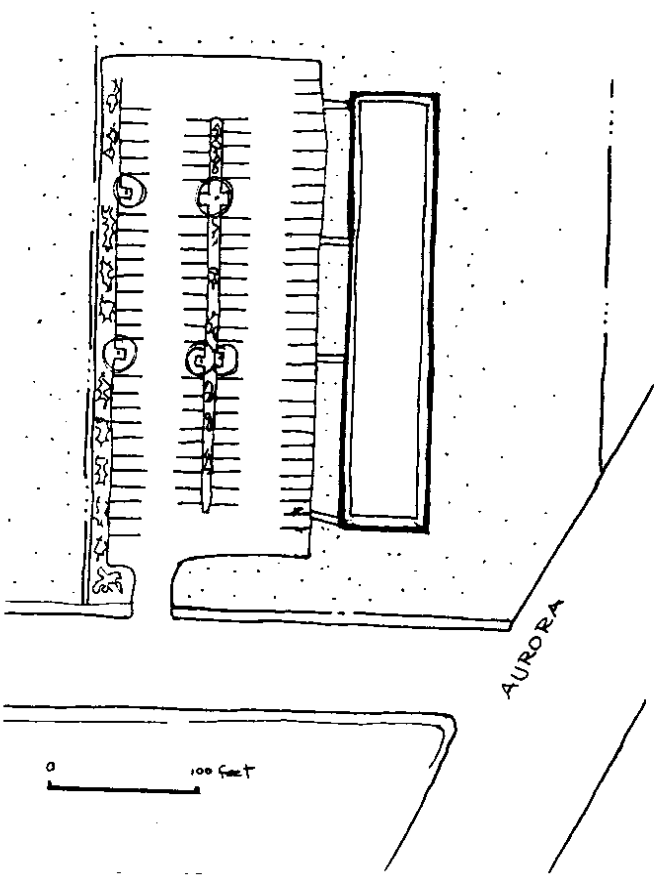
Proposed Changes (Plan View). Create connections to shops with new walkways, gates in fences, sidewalks, etc.

Example 4 Reduce the size and number of parking spaces.

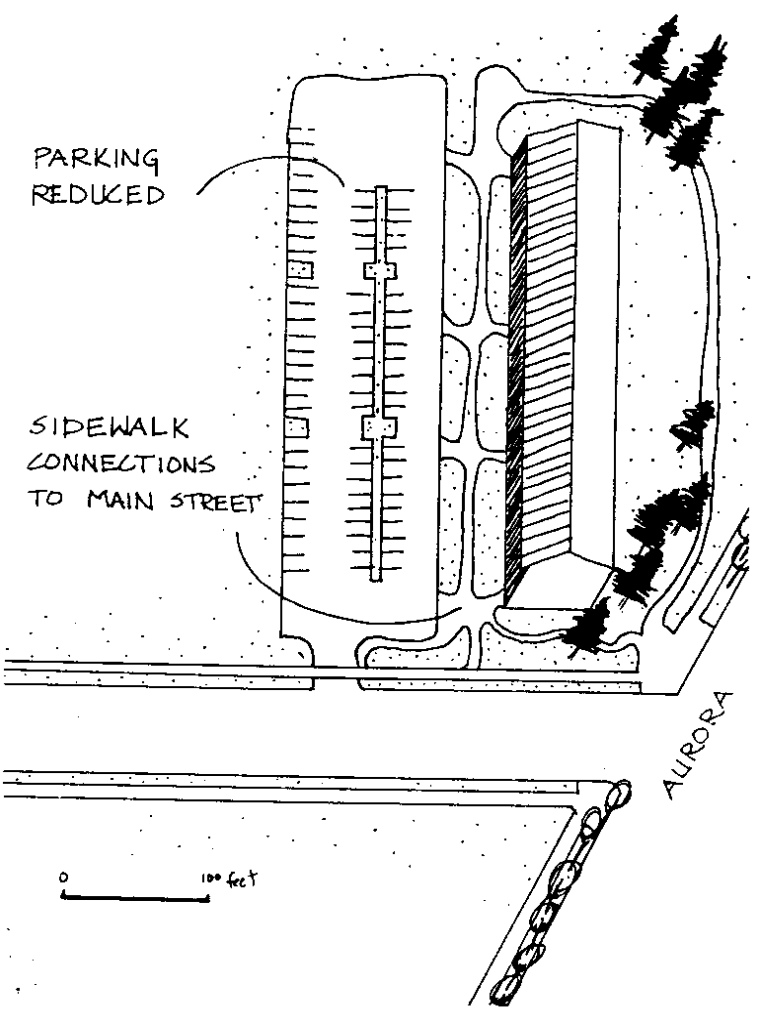
Existing conditions. In many apartment complexes all pathways lead to the parking lot and encourage the use of the private car. No sidewalks lead to the main road and the parking lot may be too large for the development. Parking lots may still be oversized to serve the large cars of the past creating an excessive parking lot and driveway maneuvering room that could be better used.

Suggestions for improvement. Create sidewalk connections to main roads and to the other buildings. Sidewalk connections should join buildings to other buildings and main thoroughfares. Sidewalks should be raised across driveways to remind the automobile driver of the presence of the pedestrian. Parking lots should be reduced in size due to increased use of HOV para-transit and our smaller cars. The 'new' land can be used for entry, planting and other amenity uses. Substituting a row of parallel parking for perpendicular parking is an efficient way to minimize parking loss.

Photo of Existing Conditions. Note the parking lot almost touching the building, presenting unpleasant views from each unit's windows. No sidewalk or safe means of reaching the street exists.



Existing Conditions (Plan View). Oversized parking lots leave no room for safe pedestrian entry, landscaping, or other amenity.



Suggested Changes. Reduce parking lot size to provide room for walkway and landscaping. Install sidewalk leading to HOV lane. Plant trees for improved living conditions.

Section 4

Street Design—Shaping the Road to Meet Land Use Needs

Introduction

This Street Design section offers suggestions for reconfiguring the roadway to better serve existing or proposed land uses. Just as land uses may change to enhance the transportation system, the roadway may also be altered to mitigate problems it causes to valued land uses. For example, portions of the existing roadway may best be used for planting or wider sidewalks; on-street parking may be necessary near retail areas; noise barriers may be needed; or the roadway itself may be narrowed. To accomplish this, public agencies and citizens need to recognize that the pedestrian part of the road is as important as the automobile part to insure an adequate and efficient transportation system.

Varying the Roadway Width

Traffic planners often stress the need for roadways to be a uniform width for their entire length. However, for the para-transit idea discussed in this study to work, places along the arterial may have to be narrowed to support non-through traffic activities. Luckily, there are many examples of arterials narrowing in places. For instance, in Seattle, Lake City Way at 125th changes from a six-lane State Highway to a "small-town" Main Street with on-street parking, busy sidewalks and mid-block crosswalks. Even on Highway 99, the width shifts between 4 and 7 lanes. Narrowing the roadway could mean eliminating a lane of traffic (for instance, the HOV lane, one through lane, or the turn lane), narrowing lane width, allowing on-street parking, etc.

Travel lanes on the Aurora Bridge (south of the study lane) are 9.5 feet wide. The 6 lane bridge carries 73,500 vehicles per weekday at speeds of 35 mph. Its success at carrying large volumes at relatively high speeds can be attributed to the uninterrupted road edge—conditions also appropriate to HOVs.

On Street Parking. On-street parking might be allowed on Highway 99 near 3 recommended Suburban Centers, thereby reducing the apparent width of the street. Pedestrian friendly streets work best when there is on-street parking. Parking slows the speed of passing vehicles, separates traveling cars from pedestrians on the sidewalk, and makes it easy for people to move between driving and walking. Furthermore, on-street parking would continue the pattern that has existed along the historic portions of Highway 99 (See Photo 4.1).

Photo 4.1. Original strip buildings along Highway 99 were located close to the street, with parking adjacent to or almost on the street. The buildings created a stronger visual edge to the road than later buildings which were set back from the road.

Interrupting the HOV Lane. The study participants questioned whether HOV lanes needed to be continuous and uninterrupted along the entire road. This issue seemed particularly important at mixed use Suburban Centers where narrowing the roadway reinforced pedestrian orientation. These Centers may need a narrowed road section and on-street parking to improve retail activity, and there may not be enough room for the HOV lane.

Because few HOV's have been installed on arterials, design standards are not yet fully understood. However, the study participants concluded, based partly on the many short segments of HOV lanes that exist in the region, that they could start and stop as long as HOV's were given priority over other vehicles. Priority could be given with traffic signals set to allow 'queue' jumping just before the HOV lane ended.

One solution is to merge the HOV lane with other traffic and

start it again just after the mixed use area, using queue-jumping signals to even out the HOV's flow. Another solution is to eliminate one of the Single Occupancy Vehicle traffic lanes (there should be 2 in each direction). That would allow one HOV lane and one mixed traffic lane in each direction through the Suburban Center.

Narrowing Traffic Lanes. Traffic lanes along Highway 99 are often too wide to serve mixed use developments. These existing lane widths vary from 12 to 14 feet, and are wide enough to support speeds over 45 mph. Lane width reduction is recommended where travel speeds are reduced. For instance, the study recommends a 25 mph speed limit in the vicinity of the mixed use Suburban Centers, and concurrent travel lanes could be reduced to 10 feet wide. The study recommends a 35 mph speed limit along the remainder of the Highway, and these lanes could be 12 feet wide. Turn lanes are also extra wide in places, and could be narrowed to 11 feet.

Boulevards. Boulevards with planted medians, generous sidewalks and planting strips establish a quality setting for a busy arterial. Gilman Boulevard in Issaquah and Lake Washington Boulevard in Kirkland are model "highway scale" boulevards, offering amenity, and pedestrian safety where apartments or office buildings are located along arterials (See Photo 4.2).

Photo 4.2. Boulevard planting along recently constructed arterial offers pedestrians, bicycles and HOV users safety and comfort. Yet the road is free flowing for vehicles. Most of the shopping entries are from side streets, leaving the arterial free from interruptions.

Medians. If most of the retail activity is diverted to the Suburban Centers, the need for continuous left turn lanes should be diminished. Already portions of Highway 99 in Lynnwood prohibit left turns with a raised median (See Photo 4.3). As left turns are eliminated, the lane could be eliminated and planted with trees, or it could be reconstructed as shorter planted sections, accommodating left turns where necessary (see Photo 4.4). The planted medium could be a refuge for pedestrians crossing at mid-block, and major trees could visually scale down the apparent width of the street and make it boulevard-like.

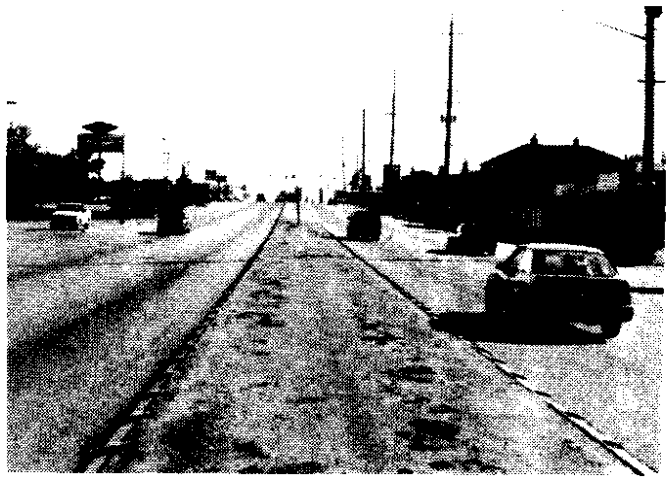


Photo 4.3 . Existing median in Lynnwood prevents left turns for about 1/2 mile, even though there are driveways on both sides of the street. Planting the median would visually scale down the highway.

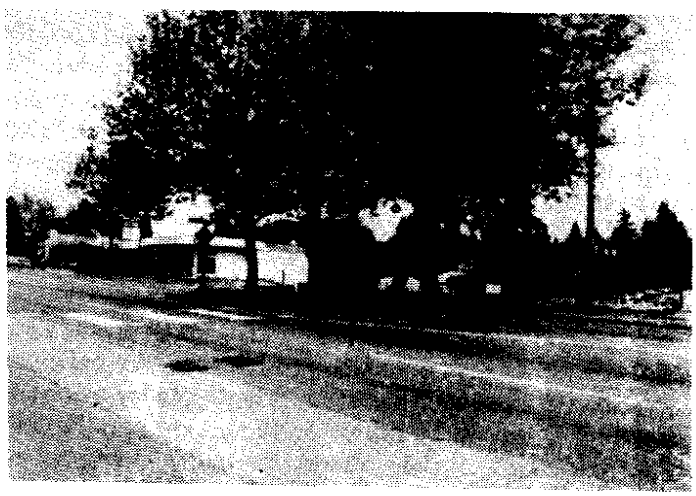


Photo 4.4. Example of discontinuous planted median strip used also as a mid-block crosswalk.

The median width could also be added to each side, thereby widening the sidewalk (see Figure 4.1). To do this, the roadway would taper gently from the intersections for a

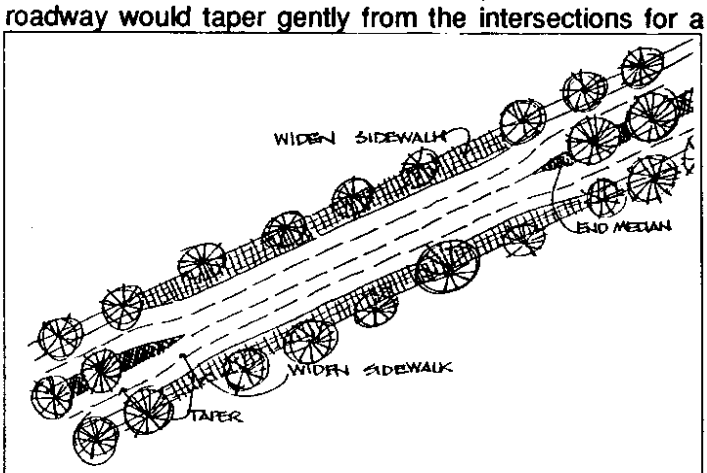


Figure 4.1 Median width added to sidewalk areas.

distance of say 200', squeezing traffic toward the center, and converting the median lane to each edge. Alternating sidewalks along Central Avenue in Albuquerque, New Mexico does this quite effectively.

In contrast, the north portion of Highway 99 offers opportunities to create a fast through route in the center of the street, with local access lanes along each side of the road. This street section is similar to the Champs d'Elysées in Paris. (See Figure 4.2)

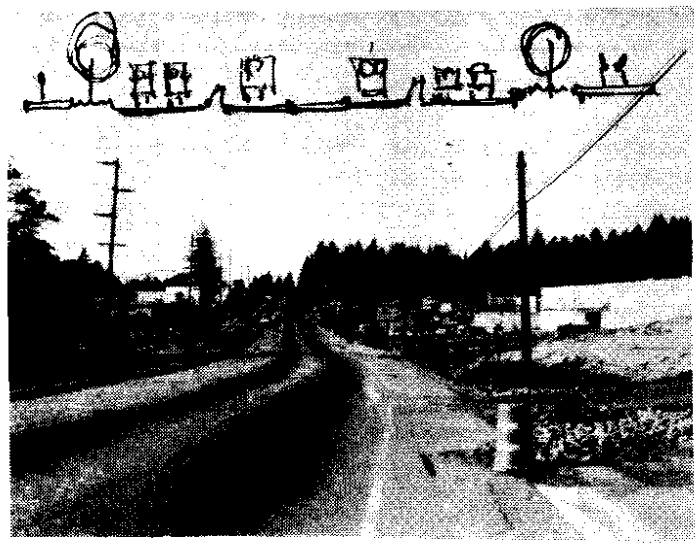


Figure 4.2 Road section along Highway 99 near 164th showing a "center" travel lane.

Slowing Down Traffic

All over America, communities are experimenting with street designs that slow down automobile traffic. Most strategies slow automobiles by narrowing the street width and creating a certain amount of confusion and congestion. Trees planted close to the street visually reduce the apparent street width as they mature. Varying the curb alignment at the intersection and adding traffic circles (probably not on arterials) also causes motorists to slow down.

Lowering Speed Limits. The study recommends instituting a maximum speed limit of 35 miles per hour along the non-retail sections and 25 mph near the Suburban Centers. The current speed limit is 45 mph, which severely compromises the safety and comfort of pedestrians. Many motorists travel faster than 45 mph. The recommended 35 mph limit is a more reasonable speed for suburban arterials, and may be closer to the speed traveled during congested travel times. Safety and fear for personal concerns are factors that reduce pedestrian and bicycle activity on 4-lane streets. An arterial with four to six lanes of traffic and travel speeds of 45 mph is intimidating to most pedestrians, and the task of crossing the street is complicated.

On Street Parking. On-street parking reduces the width of the street and tends to slow down traffic. Angle parking works even better than parallel parking, because more cars can be accommodated in the same space and motorists are alert to cars backing up. The Main Street of most US towns had angle parking during the 30's, 40's and 50's (many still do). Some cities reduce the danger by reversing the traditional direction of parking—backing in and driving out. The on-street parking lane could be a "clear zone" where parking is not allowed and the lane is used for HOVs during peak periods.

Eliminate Free Right Turn Lanes. Free right turn lanes widen the intersection, making street crossing difficult for pedestrians (See Photo 4.5). Their wide turn radius allows drivers to speed around the corner, further complicating street crossing. Free right turns in the vicinity of Suburban Centers should be eliminated, and the extra space returned to the pedestrian area.

Photo 4.5. Eliminate Free Right Turns such as this, and tighten up the turn radius to reduce the speed of turning vehicles. Tightening the turn radius also provides more waiting space for pedestrians.

Mid-Block Crossings. Suburban blocks are too long for pedestrians to cross at the intersection, and mid-block crossings are necessary to encourage walking. Despite previous traffic planning practices prohibiting them, many communities are now installing mid-block crosswalks, and having fewer problems than traffic planners anticipated (see Photo 4.6). Mid-block crosswalks need to be well

Photo 4.6. Mid Block Crosswalk along Lake City Way (a State Highway). Note the bold striping, overhead sign, and handicap walk through the median. The median is a helpful crossing refuge.

marked, striped, lit and combined with a raised median to insure safe waiting before crossing the remainder of the road.

Pedestrian Safe Cross. At Suburban Center intersections, narrowing lane width with a long, tapered sidewalk increases pedestrian space at the crossing (See Figure 4.3) This treatment would slow travel speeds, and could be given a special identity with street trees, sidewalk treatment, signage, mid- block crossings, etc.

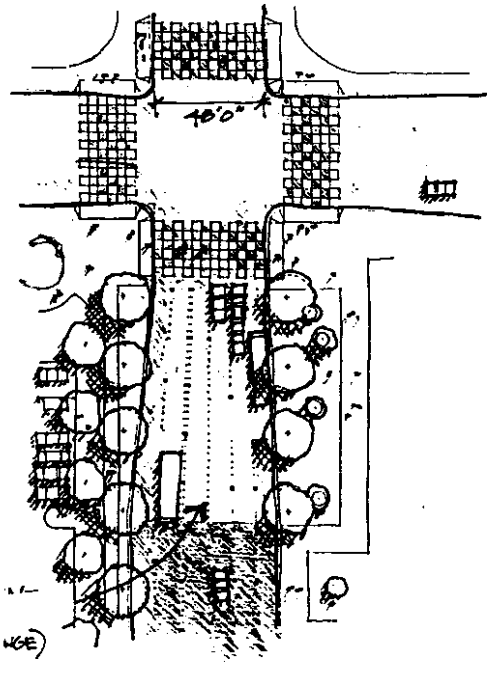


Figure 4.3. Plan showing lane width reduction at intersection to enlarge pedestrian waiting area.

Right Turns Near HOV Lanes. Single occupancy vehicles turning right may cause delays for outboard HOVs. Right turning vehicles waiting for pedestrians to cross the street could cause delays to the HOVs. One possibility is reserving the lane just inboard of the HOV lane for right turns.

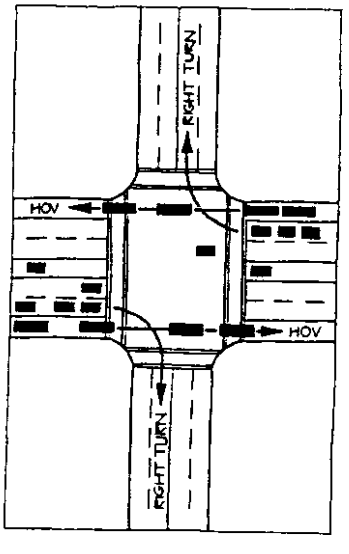


Figure 4.4. Diagram of "inboard" right turning lane option

Signalization would hold the right turning vehicles until all the HOVs had cleared the intersection, then allow the SOVs to turn right (see Figure 4.4).

Creating Safe Sidewalk Areas.

Outboard HOV lanes (adjacent to the sidewalk) may be the best location for ride-sharing and for short haul situations. That location allows safe loading of pedestrians to buses and carpools. However, large vehicles traveling at 25-35 mph immediately adjacent to the sidewalk can appear dangerous to many pedestrians. Furthermore, the narrow sidewalks constructed immediately adjacent to the roadway—as is current highway practice—are unsafe and uncomfortable for pedestrians.

Sidewalks need to be separated from traffic by either extra width or a planter strip (see Photo 4.7). Sidewalks adjacent to apartments and commercial office developments can be 6 feet wide if they have a 6 foot wide planter strip. If no planting strip is proposed, the sidewalk should be at the minimum 8 feet wide (See Photo 4.8-next page). If bicycles are anticipated, increase the width by at least 3 feet.

Photo 4.7. Appropriate arterial sidewalk section with wide planter strip and sidewalk.

Buses running in the HOV lane with no on-street parking are likely to interfere with street trees planted adjacent to the curb. To overcome this problem, trees can either be planted on the back side of the sidewalk—at least 12' from the curb—or they can be limbed high when planted next to the curb. This author prefers locating the trees close to the street, and limbing them up, as it produces a larger canopy over the street; or allowing parking, so the buses are kept at least 7' away from the curb. (see Photo 4.9, next page)

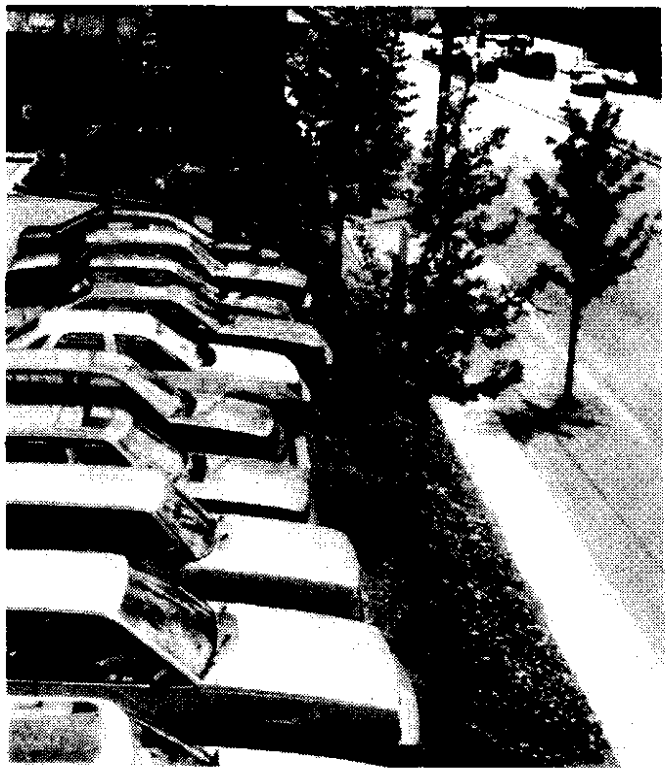


Photo 4.8. Minimum 8 foot wide sidewalk with no planter strip. Note the parking is separated from the sidewalk by a 6 foot wide planter. The double row of trees helps reduce the visual scale of the parking lot. Note the building is located adjacent to the sidewalk, affording easy pedestrian access to the shops beyond

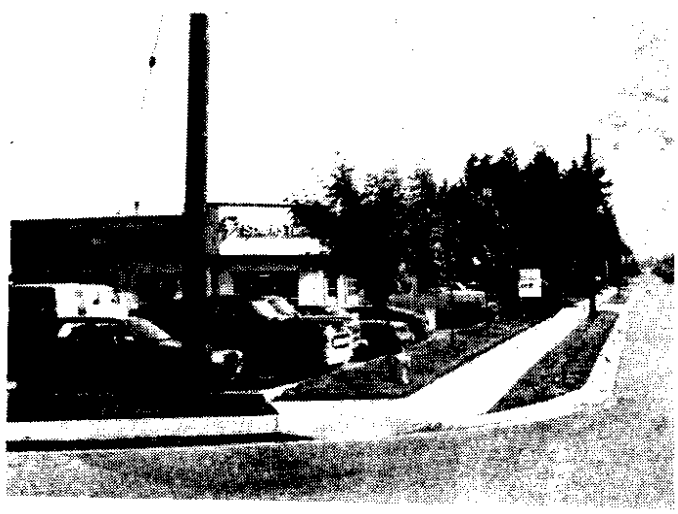


Photo 4.9. Trees planted at the back of the sidewalk.

Bus stop waiting areas should occur on widened sidewalks, and be connected back into the residential areas by safe sidewalks (See Photo 4.10).

Bicycle Storage. Bicycles are an ideal means to move from home to a ride-sharing stop, providing safe and secure storage would encourage their use. Bicycle racks or lockers may be required in the street right-of-way near ride-sharing and transit stops (See Photo 4.11). While bicycle lockers are more secure, all bicycle storage should be visible. Fifteen bikes can be stored in the space required to park one automobile, so the land use efficiency is very high.

Photo 4.10. Many bus stops along Highway 99 are totally surrounded by roads or parking, with no protection or comfort for people waiting for the bus.

Photo 4.11. Bike storage should be visible to ensure rider safety late at night. Ideally these racks would be covered for improved winter use.

Integrating Transit The HOV lane should have direct access to the heart of each Suburban Center (See Photo 4.12). It is also desirable to construct direct HOV access and egress lanes into the parking lots of major employers as a timesaving device to encourage ridesharing by employees. The potential convenience may be enough to convert drivers to ridesharing.

Photo 4.12. Transit station near Aurora Village allows ridesharing vehicles to reach the heart of this Center. Future new buildings constructed in the parking lots should connect to this station to increase the safety and comfort of riders walking to the Center.

Section 5
Implementation

Introduction

Every technique necessary to implement the various ideas discussed in this report has been tried and tested in America. Yet the conversion of strictly auto-oriented environments to ones which support pedestrians and transit won't be easy, quick or inexpensive. Breaking away from auto dependency will require nothing short of a complete transformation of our suburban communities. Some techniques for making the shift are inexpensive but politically complex, like changing zoning, or establishing design guidelines. Others will be expensive, like constructing pedestrian friendly infrastructure. Some of the actions proposed in this paper have not yet received suburban institutional backing; mixed land use and density increases, for instance, suffer from negative images.

"Roadshed Planning"

At the largest scale, there is need for what the study participants called 'Roadshed Planning'. This joint effort between transportation and land use planners, various municipalities, and the private sector is the key to improving the quality of life in the Northwest. A growing number of municipal officials now support such coordinated planning, and transportation may be the one force that is powerful enough to ignite this movement. The planning system should encourage the *redevelopment* of suburbs and discourage the development of raw land.

The roadshed planning concept treats the arterial and its corridor as a unit, similar to the watershed or catchment used by ecologists in studying and manipulating natural processes. The Suburban Center model presented in this paper calls for designation of several functional areas within the Roadshed, defined as Highway 99 between I-5 and Puget Sound, along with the lots fronting it and the surrounding residential neighborhoods. Functional areas would include the arterial itself, various Suburban Centers, located along the arterial at intervals of roughly one mile, areas of office and high-density residential frontage, theme shopping centers, and areas of lower density housing. Such an approach would make the land use/transportation integrations discussed in this study possible. It could allow economic incentives, making implementation easier.

The cost of constructing pedestrian infrastructure would probably be beyond the means of the private sector. However the development would have long-term social advantages, and should be within the realm of financing through a combination of private sources and government assistance.

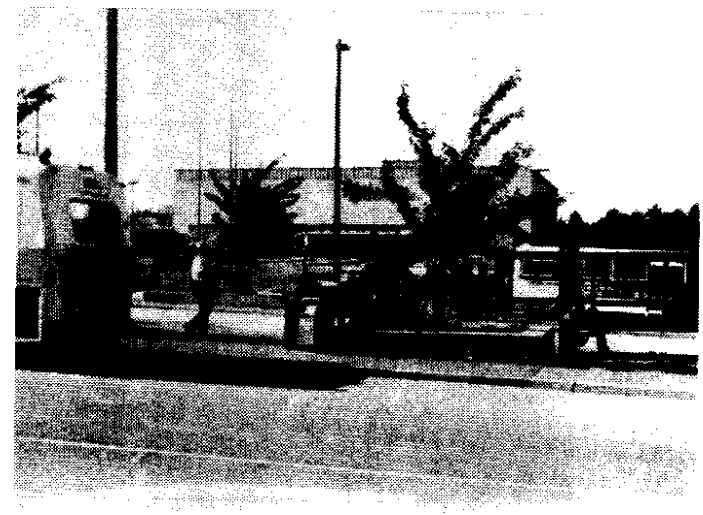


Photo 5.1 HOV and Transit stations with shelters, and sidewalks connecting nearby stores and apartments would be necessary at each of the Suburban Centers

Some of the recommended actions, assuming establishment of a transportation/land use integrated Roadshed Planning organization, include:

Designate Suburban Centers. The concept of Suburban Centers involves developing suburban nodes where sources of goods and services are clustered within walking distance of housing and, where appropriate, office/professional frontage. By developing a vision statement in which such Centers are a goal, planners can tune their approach to meet the needs of each neighborhood or suburban area. Like a master plan, a vision plan, which typically designates uses based on certain predetermined goals, would be a way for community members, working with planners, to develop a long-range vision of what they want their neighborhood to be, within the framework of the suburban center model. Such an approach would be an effective tool in developing concensus and overcoming the "NIMBY" attitudes which often hinder long-range planning efforts at the neighborhood scale. Working with residents and local business people, planners can focus on details of community structure and use those that support the Suburban Center

concept to develop a vision which works for a particular neighborhood.

Pay More Attention to "USE." Most zoning codes are general when it comes to the "use", allowing a wide range of uses in each zone. However, "compatible" shopping benefits both pedestrians and auto shoppers, and certainly has advantages in the context of the HOV idea. Stricter "use" designations can make the Suburban Center and Theme Shopping portions of the Roadshed Planning concept work better.

Develop Auto-Oriented Theme Shopping Areas. In areas fronting the North portion of Highway 99 and outside the Suburban Centers, clusters of related businesses may offer more efficient shopping for drivers while leaving the Suburban Center areas free for uses which don't require automobiles. For example, the portion of the study area south of 164th could be developed as several Theme Shopping nodes. That area currently supports a lumber company, a home center, a plumbing shop and several other do-it-yourself stores which might work more effectively if clustered together with internal walkways and connecting roads. One home center exists near Lacey, another called Town Center Village is at work in Marietta, Georgia; various others dot the landscape. (see Photo 5.2)

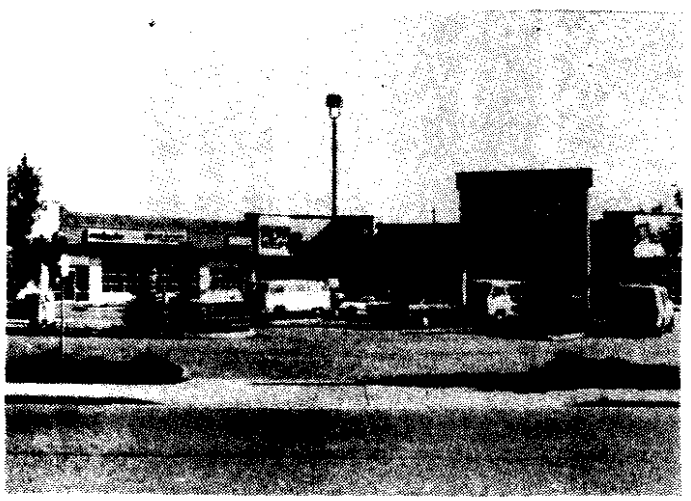


Photo 5.2 Theme shopping on Highway 99, complete with landscaping and walkways.

Purchase Open Space. As density increases, so does the need for parks and open space. Suburban communities are not used to providing neighborhood parks, so this will require additional effort. Large open spaces are necessary to minimize the amount of overall congestion. The British were among the first to recognize that congestion in urban areas results in part from the total size of the built up area; that realization helped them establish a Green Belt plan around London. Land availability in the corridor is limited, however large parcels still exist near 164th.

Renovate Existing Shopping Centers. Many developers are feeling the pinch of today's recessionary economy, in the form of over-built retail markets and tighter credit. For this and many other reasons—accessible raw land is at a premium, competition is on the rise, and major department stores are going out of business—renovation of existing shopping centers is likely to surpass new construction for several years to come. (See Photo 5.3)

Renovations should increase density to provide additional store space for new tenants, reducing the number of parking spaces to make way for new buildings. New buildings should be located directly on the street, so shoppers can reach all stores on foot, and from transit stops. Many of the old enclosed malls are being opened up to create a fresh and different feel, and adding professional and medical offices to help support the new stores.

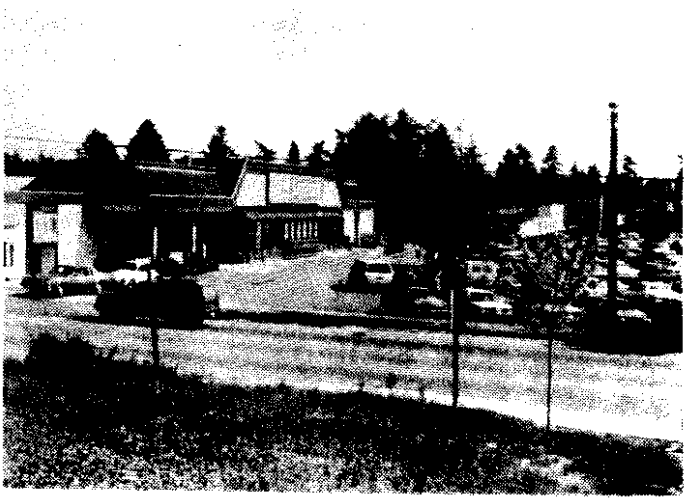


Photo 5.3 Highway 99 includes at least a dozen neighborhood shopping centers such as this one that could be intensified to serve more shopping and daily needs. Most stores consist of only one story, leaving considerable room for increasing density.

Balance Housing and Jobs. New retail or office construction should balance housing opportunities by constructing apartments nearby. The needs of each location will vary; the idea is not to favor a particular use, but to maintain a balance within which residents' needs can be met within walking distance of their houses, and businesses can thrive.

Increase Density. Higher density is the key to the Roadshed Planning ideas discussed above; residents need to be able to walk to Suburban Centers from home for HOV lanes to function without park-and-ride lots. Target densities might be 10-20 DUA in residential blocks fronting the arterial, 2-3 FAR in Suburban Centers, and 8 DUA in existing neighborhoods which surround the Suburban Centers. In those existing neighborhoods, densities could be increased by allowing the use of nanny flats and other minor densification techniques.

Mix Land Uses. Public policy must favor mixed use development in its local land use actions to make the ideas

proposed in this study work. Mixed-use development—mixing housing, work, shopping, learning and play within walking distance of each other, will serve the pedestrian far better than single-use projects. It helps create a more lively street environment and a balance of jobs and housing in the Roadshed in addition to furthering the HOV transportation goals of this study. The Urban Land Institute notes that "well-located, older suburban commercial areas and suburban downtowns are likely to see more new mixed use development." The article goes on to note that "this will be especially important in regions where traffic has become a problem and with a jobs/housing imbalance." In the slower development climates of the 90's, building on and around existing complexes in good locations will become increasingly important. Those patterns are exactly those the study areas are focusing on.

The Fairfax County Policy Plan proposes that the majority of the county's future employment and residential growth will be in Mixed-Use Centers near transit stations. Projects similar in concept to those proposed in this study include the Cupertino City Center, the Janss Court in Santa Monica, the Village at Shirlington in Arlington, Virginia (redevelopment of a small suburban shopping center into mixed use), and Mizner Park, in Boca Raton, Florida (ULI March '91, Special Trends Issue).

The current zoning along the road is predominantly commercial. Though each of the jurisdictions vary slightly, in general the zoning would accommodate most of the uses that are proposed in this study .

Infill Granny Flats in the Neighborhoods. Single family neighborhoods that surround the Suburban Centers should be encouraged to construct new "Nanny" flats in the rear yards, or convert portions of the house of garage for roomers or apartment dwellers. Increasing the density in existing neighborhoods is key to HOV success. Furthermore, it provides decent housing in quiet neighborhoods for the small families or single people who can't afford or don't want to own a house.

New Street Standards

Develop a uniform guideline for street development, and apply it to the whole roadshed. The study participants had a strong feeling that the quality of the road depended partly upon the jurisdiction it was in—it was very low quality in the county and somewhat higher in the town of Lynnwood. Standards should include pedestrian-friendly sidewalk sections, alternative median treatments, landscaping, and crosswalks. In addition, possible innovations include:

Develop a GRID Structure Throughout the Roadshed. It should be possible to introduce new streets and paths as the "backbone" of an area, eliminating the super block pattern by making the grid finer and finer as density and development increase. Roads do not need to be wide—a 40 foot right of way can handle the foot and auto traffic of modestly dense developments. (See Figure 5.1)

Figure 5.1. Each neighborhood should develop a Grid circulation system to maximize access to those on foot. The grid can be streets, paths or shortcuts through buildings.

Narrow Travel Lanes. The majority of lane widths along Aurora are excessively wide (between 12 and 14 feet); they could be narrowed to create room for HOV lanes and pedestrian movement. Reducing the speed of travel allows for narrower lanes. For instance, the 9 foot lanes on the Aurora Bridge (south of the study area) work because of the 35 mph speed limit. The study team recommended a speed of 35 mph on the "in between" stretches of Highway 99, and 25 mph within the Suburban Center district. These maximum speed limits are more appropriate to urbanizing conditions that support HOVs and pedestrians.

Pedestrian Friendly Sidewalks. Continuous, wide sidewalks with planters between the sidewalk and street, and between the sidewalk and land use are essential. Sidewalks in low density residential areas can be 6 feet wide, while in business or apartment districts, they should be 8 feet wide. Routes used for bicycles should be 10 feet wide. All intersections should have generous curb cuts, and tight radius so cars can't travel too fast. Driveways should be narrow - ideally 10 feet wide maximum, and slope outside the sidewalk area. Signals should be set to respond quickly to pedestrian's need to cross the street. Jay walking should be tolerated, as it is the mark of a friendly street. (see Photos 5.4 and 5.5)

Photo 5.5. Separate pedestrians from both the road and adjacent parking by planter strips with trees.

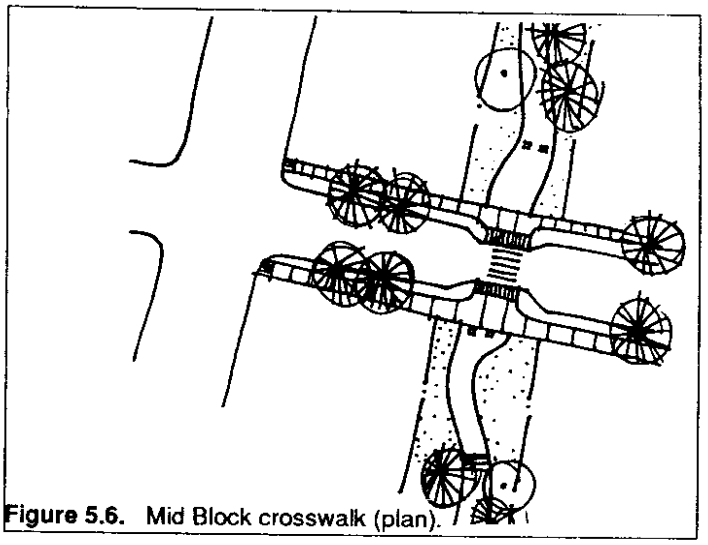


Figure 5.6. Mid Block crosswalk (plan).

Photo 5.4. Keep buildings close to the street so pedestrians can easily reach them. Awnings and window displays make walking more comfortable, and 2-3 story buildings add needed pedestrians.

Add Mid Block Crosswalks and Safe Crosses Suburban blocks are too long to make crossing at the intersection attractive to pedestrians. The mid block crosswalk solves this problem, and has worked well on a number of State Highways including Lake City Way. (see Photo 5.6)

Prohibit Right Turns from the HOV Lane. It may be possible to designate the normal through lane just in-board of the HOV lane as a right-turn lane. The out-board HOV lane could then function without the interference of right-turning vehicles. Signalization allowing queue-jumping and holding the right-turn lane until the HOV lane had moved would allow free travel for the HOV, and yet still allow one or two lanes of free-moving traffic in addition to the designated right-turn lane. (See Photo 5.6)

Photo 5.6 Free right turn lanes speed up traffic, and increase the discomfort and apparent danger to pedestrians. They should be eliminated and replaced with small radius corners.

Regulate Curb Cuts. The regulatory power to allow or reject a curb cut may cause some landowners to switch from retail to housing or offices. Most curb cuts should be off side streets. Limiting the number of curb cuts could force cooperative planning between abutting properties and result in a better mixture of compatible shopping, housing or offices. Substantially reducing the standard driveway width, say to 15 ft., makes it appropriate for pedestrians and HOV use. Wide driveways, lack of curbs and automobiles parked erratically make walking unsafe and difficult.

Cul-de-sac Connectors. Creating walking shortcuts by

interconnecting pathways at cul-de-sac heads can dramatically shorten the walking distance to neighborhood centers from the lower-density communities. A mechanism to fund such walkways should be developed. For instance, acquiring the fee or easement rights as properties are put up for sale may be one way to implement the concept. In new developments, increases in density could be allowed in return for dedication of pedestrian right-of-way strips along property lines. Care in increasing density, to insure public value, would further the neighborhood return.

Parking

Changing the location, design and size of parking lots is essential for the success of this scheme. The current excessive parking consumes land, decreases density, conflicts with pedestrian use, and encourages driving. Some recommendations include:

Reduce Required Parking. The parking requirement for new development should be reduced as a way to free up space, enhance the pedestrian environment and generally encourage ride-sharing and walking. How much parking is desirable? Perhaps one space per dwelling unit for residential developments, and one car per thousand square feet of office or retail would bring the street closer to a proper balance.

Locate Parking Carefully. Retail parking should not be located between the street and shopfronts; such an arrangement is unfriendly to pedestrians. Instead, locate it behind or alongside buildings. Merchants may complain, and some may be compromised by that requirement. However, for the larger complexes, and service providers such as banks, real estate agencies, doctors, travel agencies, and so on, the change should pose no real problem.

Connect adjacent parking lots that are isolated by fences and grade changes. Making adjacent businesses readily accessible to pedestrians can reduce the number of short trips a driver needs to make to complete a day's shopping or errands. (see Photo 5.7)

Common Parking. Coordinated development can provide buildings with shared common parking areas rather than isolating them in separate lots. As with connections between adjacent properties, common parking is likely to encourage a shopper to complete several errands while leaving his or her car parked in one space. Several cities have implemented common-parking elements, using assessment formulas to calculate developers' contributions in lieu of providing code-required parking spaces. In Orlando and Saint Petersburg, Florida, for instance, ordinances permit developers to reduce their off-street parking by 20% in return for contributing 80% of the cost of that parking to a "Transportation Management System."

Charging for Parking. Free parking in shopping and employment centers increases the likelihood that people will choose to drive. Some mechanism should be developed to charge for parking in all areas within this Roadshed. Charges might be implemented through parking meters, monthly fees, or by dramatically increasing the Surface Water Management fees paid by developers who build parking lots (parking causes considerable runoff). Parking must not appear inexpensive to the provider or user. Parking at apartment complexes should be for fee, instead of included in the rent. If residents know they can save money because they don't own a car, they should be able to do so. Canyon Park apartments, a 250-unit apartment development near 164th, charges for parking. The carport rate of $15 per month is not high enough to discourage use, but the garage, at $75 per month, will certainly affect some users.

Allow on-street parking on all roads except perhaps the HOV arterial. On-street parking increases the parking pool, acts as a buffer between pedestrians and the nuisances of

Photo 5.7 Parking lots should be connected so shoppers can drive or walk between stores without traveling back on the arterial. Curb cuts should be shared by more than one store when located off the arterial.

Photo 5.8 Drive ins should be prohibited as vehicles pollute and waste energy while waiting in line, and drivers can't carry out other errands on foot.

traffic, and helps slow traffic by narrowing the portion of the street section devoted to travel lanes. Angle parking is appropriate on low-volume wide roads as it consumes space and slows down motorists.

Management

Managing resources or activities has become an important tool for planners, and offers several opportunities for improving the success of this HOV scheme:

Development of a Roadshed Transportation Management Associations. Suburban communities such as those along the Highway 99 Corridor are large and complex enough to develop management arms of their own. In Northern Virginia, the Tyson's Corner Transportation Association was formed as a nonprofit association "to achieve significant improved traffic conditions within the area". The Association collects annual dues of about $6.00 per employee for office tenants and 1.2 cents for each square foot of building. Revenues total about $150,000 per year; the Association organizes van pools and daytime shuttle service for employees, residents and visitors, and lobbies for new roads to divert and bypass traffic. Association leaders hope to reduce the number of cars on the road by 12 to 15% in five years.

Transportation Demand Management (TDM) works the "demand" side of the equation—moving people rather than vehicles. By utilizing incentives and disincentives, TDM aims to reduce the number of single occupancy vehicles. Ride-sharing and transit are key elements of the concept, so walking and a safe, comfortable walking environment are essential.

Access Management. Some jurisdictions are organizing road access (curb cuts) through active management to reduce road conflicts and encourage walking by enhancing the pedestrian environment. Direct and easy road access has been assumed to be an American right, and will require considerable hand holding, detail design, reconstruction and an occassional stronger regulation.

Financing Capital Improvements

New financing mechanisms will certainly be needed to implement meaningful changes in transportation infrastructure. The proposed changes are profound, and while the cost could be considerable, it will be low relative to the expense of developing new highways to serve the needs of our growing region. In addition, Suburban Center development will offer long-term social advantages. Several obvious funding sources exist; they include:

- Statewide motor-fuel tax increase
- Local or regional gas sales tax
- Local or regional employee utility tax
- General obligation bonds
- Parking tax
- Toll roads
- Property tax 'transportation benefit'
- Gas tax revenues.

The following strategies are also possible sources of funding for Suburban Center development:

Impact fees could finance some infrastructure investments. Impact fees have been used in Washington since 1988 to finance transportation improvements needed to support the increased travel created by new development. Although impact fees are paid by developers, the cost will be passed on to the users; the economic consequences of that arrangement must be carefully assessed. The fees also force new home buyers to pay costs that people who already own their homes and use the services don't have to pay. The most likely outcome is that impact fees will increase housing costs and widen the affordability gap.

Gas Tax Revenues. Local share of State (or Federal) Gas Tax has been limited for HOV and pedestrian improvements. The new Federal Transportation legislation may allow broader use of Gas Tax, and pave the way for states to share their portions of the tax with local juristictions. Suburban communities have been totally de pedestranized by Gas Tax revenues, and it is time to begin to correct these problems.

Metro Funding. Metro has constructed road improvements, and may be a logical agency to assist in this Roadshed. It has funded construction of an outboard HOV near University Hospital, and Seattle's downtown tunnel.

State Department of Transportation. The newish title suggests that it may be willing to assist in the construction of a full range of facilities, including sidewalks.

Local Improvement Districts, as a means of self financing, are certainly an option. Higher densities will reduce the amount of improvements necessary and spread the costs among more users.

Property Taxes. Sidewalk and bicycle improvements in the Suburban Centers and surrounding residential area could be financed with new tax revenue generated from the increased density in the neighborhood. The State of Washington does not currently allow property taxes to be set aside for specific improvements, such as sidewalks and bike trails; however, that change may occur by the time all

of the other problems of implementing suggestions within this study are possible.

Miscellaneous funding. Our current dispersed pattern of living puts great costs on both government and individuals. For individuals, the single family car once shared by all is now replaced by several vehicles per household. For government, finding ways to finance road building is becoming ever more difficult and expensive.

One Car Families. Some places are experimenting with financing housing by coupling the number of cars in a household with the price of a house. The idea is that if a family has only one car, the savings resulting from not having a second car are substantial—as much as $6,000 a year, which could be used to subsidize the mortgage or rent paid for better or closer housing.