Land Use-Transportation Linkage: Background Research Findings

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Washington State Transportation Commission
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Foreword

This technical document summarizes the preliminary research findings of a study by the Innovations Unit of the Washington State Transportation Commission on Land Use-Transportation Linkages. This study was authorized by the Goals Subcommittee of the Commission in March 1991. This white paper documents the initial research results of 1) a state-of-the-art literature review of relevant publications, articles, and studies on land use-transportation interrelationships and 2) a collection of information on existing land use practices associated with transportation in the state of Washington. The land use-transportation relationship is a bi-directional one; this document will focus on the effect of land use on transportation, and the potential transportation benefits from supportive land use policies and practices, with particular emphasis on land uses that support alternatives to the single-occupant automobile.

Editor's Note: This document (Innovations Unit Report 92.2) describes the results of the initial research phase during the period April to August 1991, with particular emphasis upon notable examples of existing land use practices in selected areas throughout this state. The text of this document was originally written as a preliminary working paper; it was also summarized in an updated document (Innovations Unit Report 92.1) and as a result, the two documents contain similar text passages and discussion outlines. The primary distinction between those two reports may be summarized in the following way. Report 92.1 contains revised/updated information, literature review results, and case studies, adds a more global overview of the issues involved, and is written in a more tightly edited, condensed format. In contrast, this document (92.2) provides detailed technical results of an initial survey of zoning practices that are not included in Report 92.1, but was written based upon information collected as of August 1991, and with a discussion format that reflects its original form as an internal working document. Because Report 92.1 includes updated information acquired since August 1991, it is suggested that the reader consider that report to be the primary research volume, and regard this document as a companion reference of supplementary examples in the areas of state zoning practices and policies.

Related Reports

A condensed synopsis and update of this research is presented in the summary report, Land Use-Transportation Linkage (Innovations Unit Report 92.1). A critical analysis of the literature in this field is documented in a companion report, Land Use-Transportation Linkage: Literature Review and Analysis (Innovations Unit Report 92.3).

Acknowledgements

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The views expressed in this document are solely those of the author(s), and do not necessarily represent the official positions of the Washington State Transportation Commission, the Research and Intermodal Planning Offices of the Washington State Department of Transportation (WSDOT), or the Washington State Transportation Center (TRAC).

I. Introduction and Research Approach

Introduction

Land use and transportation are generating intense interest as major issues in this state. Concerns over environmental preservation, urban "sprawl" and future quality of life have brought land use and growth management issues to the forefront of public consciousness. Similarly, transportation professionals and the general public have been grappling with the problem of increasing automobile use, the resulting traffic congestion, air pollution, and safety hazards, and the challenge of effectively supporting and improving our public transportation alternatives.

In recent years, the **relationship** between land use and transportation has been prominently featured in academic studies, political discussion, and government legislation. In Washington state, the 1990 State Transportation Policy Plan explicitly recognizes this linkage, and recommends consistent goals and coordinated actions between the two components. The plan urges the state to promote community, regional, and statewide planning efforts that directly connect transportation with land use.

Recognition of this relationship has also grown with the increasing interest in growth management issues, and particularly with the passage of the Growth Management Act of 1990 by the Washington State Legislature. That program specifically identifies the importance of the transportation element in land use planning and growth management, and mandates that the most populous and fastest-growing areas of our state establish transportation plans that operate in concert with future land uses. The program also includes a concurrency requirement, which directs developers to make a commitment to mitigate the transportation impacts of a proposed land use and ensure that level-of-service standards for the community's transportation system will continue to be met.

Both individually and as a linked pair, land use and transportation issues have risen to positions of prominence in the public and legislative agenda. With the acknowledged importance of their interrelationship, an updated source of information that summarizes existing land use practices in Washington state and provides concise descriptions of existing and potential transportation linkage strategies is desirable. With the passage of the Growth Management Act and its enabling legislation, such information becomes all the more important given that many details of growth management implementation are left largely to individual communities and regions. Policy makers, transportation professionals, and urban planners at all levels will require objectively researched information on existing practices, issues, and potential linkage options to help 1) develop sound decision-making processes that integrate transportation and land use concerns, and 2) successfully meet

the requirements and intent of the Growth Management Act.

This report summarizes the results of a comprehensive literature review and study of state-of-the-art land use-transportation linkage practices in this state and elsewhere, and includes a descriptive inventory of the present state of institutional linkages in Washington state. The study identifies and analyzes individual linkage concepts, and describes the potential benefits of specific approaches that exploit the land use-transportation connection to improve mobility, enhance this state's environment, and promote enlightened land use.

Goals and Themes

The goals of this study are as follows:

1. Document existing and planned land use practices and governing policies in Washington state that have a potential influence on transportation. This includes city and county comprehensive policy plans, land use codes, and ordinances, as well as state land use and transportation policies and legislation.

2. Identify land use attributes that are believe to significantly affect transportation, and summarize principal concepts of land use-transportation linkage.

3. Describe existing strategies that have the potential to successfully link land use attributes with desired transportation goals, and research any examples in Washington state that illustrate that potential.

4. Research new or proposed linkage strategies that will be potentially successful in Washington state, and illustrate their implementation.

5. Explore the potential role of the Washington State Transportation Commission and the state Department of Transportation to encourage, facilitate, or require the implementation of linkage strategies.

Scope of Study

The fourteen study regions that form the geographic focus of this research include six counties and eight cities in Washington state:

Counties
Clark
King
Kitsap
Pierce
Snohomish
Spokane

Cities
Vancouver
Bellevue
Renton
Seattle
Bremerton
Tacoma
Everett
Spokane

These areas have a combined population of over 3.3 million, and were selected to provide a representative sample of land use and transportation ordinances and policies that govern diverse population centers and growth patterns in Washington state. In addition, examples of innovative approaches from other areas in the United States, Canada, and elsewhere are also included in this study as appropriate.

Because of the complex relationship between land use and transportation, the scope of this research includes not only policies and practices that directly identify a connection between transportation systems and land use (e.g. parking requirements, development bonuses for transit amenities, etc.) but also other aspects of land use and zoning that have an indirect yet potentially significant impact upon the public transportation system, such as residential and employment densities, site design, and the integration of land uses. In addition, this research includes an overview of notable state

and regional policies that pertain to land use and transportation, and describes legislation that affects land use, transportation, and their interrelationship.

Methodology

This study project has five parts. Part 1, Literature Review, is a study and synthesis of recent relevant reports, surveys, books, articles, ordinances, and legislation that are associated with land use-transportation linkage issues. Part 2, Information Collection, is a survey of existing policies and practices concerning land use and transportation linkage in Washington state. Research data is collected on direct transportation linkage policies, as well as land uses that indirectly influence transportation, in fourteen major metropolitan and emerging suburban and exurban areas throughout this state. Relevant developing trends elsewhere in the United States and Canada are also reviewed. Part 3, Data Analysis, uses the results of this inventory to extract, define, and illustrate key land use attributes that affect, and are affected by, transportation systems and policy. These attributes are matched with corresponding public policies and supporting strategies and synthesized into potential state policy themes. These themes are then illustrated with examples from Washington state, and analyzed for their effectiveness. In Part 4, Policy Synthesis, potential linkage approaches that hold the most promise in Washington state are summarized, and the potential role of the state Transportation Commission and other public and private institutions in this state in implementing these strategies is considered. The study concludes with Part 5, Recommendations, which identifies future courses of action by the Commission. **The information in this report reflects the preliminary results of Parts 1 through 3 only.**

II. Findings

The study findings are divided into two sections, State and Regional Policy Goals and Legislation, and Land Use Codes.

Section IIa, State and Regional Policy Goals and Legislation, summarizes recent legislation and policy statements that address transportation and land use issues. This includes state transportation and land use policies, recent state land use/growth management legislation, and state transportation legislation and city/county ordinances that pertain to transportation funding, transportation capacity/demand management, and concurrency requirements.

Section IIb, Land Use Codes, summarizes existing or recently proposed city and county codes, ordinances, and statements of policy that pertain to land use and transportation. This discussion is organized by land use concept, and progresses from individual themes to larger development-level land use concepts, concluding with metropolitan and regional planning strategies. These themes are presented in the following sequence:

Individual Themes
Residential Densities
Employment/Activity Center Densities
Parking Requirements
Transportation Programs

Project Themes
Mixed Use Developments
Site Design Provisions
Master Planned Developments

Metropolitan/Regional Themes
Metropolitan/Regional Planning
Jobs-Housing Balance
Growth Management Considerations

IIa. State and Regional Policy Goals and Legislation

The following discussion describes recent policies, legislation, and ordinances in the state which are associated with land use and transportation linkages. This section is organized into subsections on State Policies, State Growth Management and Land Use Legislation, and State and Regional Transportation Legislation and Ordinances. Information is based upon Washington State Department of Transportation, Washington State Department of Community Development, and Legislative Transportation Committee documents listed in the bibliography, as well as relevant codes.

State Policies

The State Transportation Policy Plan (STPP) is the result of an ongoing policy planning process that was developed by the Washington State Transportation Commission and the Department of Transportation. This process combines studies of evolving transportation policy issues with public forums and citizen input; the plan and its updates are the product of this effort and are intended to represent a consensus view on major transportation policy issues in this state.

The 1990 report of the State Transportation Policy Plan spells out the importance of growth and land use planning issues as they pertain to transportation. It states: "Land use and transportation policies must be coordinated and mutually supportive, because land use development determines how well our transportation system works, and transportation facilities are a key factor in influencing patterns of growth." It recommends that the state define the role of state and local planning, describe the contents of comprehensive plans and their transportation elements, and require that effects of development on the transportation system be considered prior to development approval.

The policy planning process also identified Land Use/Transportation linkage issues as a major STPP study topic. That study effort is being coordinated with associated state planning activities in the WSDOT Research Office, as well as the research described in this report.

State Growth Management and Land Use Legislation

In 1990, the Growth Management Act (GMA), was passed by the state Legislature. This landmark legislation identifies the following transportation-related objectives:

- Ensure improvement of public facilities concurrent with new development
- Provide coordinated multimodal transportation services
- Encourage economic development statewide
- Protect and enhance the environment

- Encourage citizen involvement
- Ensure that public facilities meet community-defined level-of-service standards

The GMA provides the following requirements and mechanisms to meet those objectives:

- Constraints on urban growth
- Critical area designations
- Consistency with comprehensive plans
- Annexation limited to urban growth areas
- Designations of future land use
- Impact fee provisions
- Regional coordination tools (e.g. Regional Transportation Planning Organizations)

The GMA requires all counties that meet threshold requirements of population or growth rate (50,000 people and a population increase of at least 10 percent during the past 10 years, or a population increase of 20 percent regardless of population), as well as all cities within those counties, to develop comprehensive plans by July 1, 1993, and to approve consistent zoning within 12 months after approval of the comprehensive plan. Other counties may optionally participate. At present, 26 of the state's 39 counties, representing over 84 percent of the state's population, are mandated, or have chosen, to develop comprehensive plans.

A key element of the comprehensive planning process described in the GMA is the development of a long-term community-generated vision for city and regional development, and the linkage of those visions to implementation plans. A comprehensive plan, based upon the community vision, must include the following plan elements: land use, housing, capital facilities, utilities, rural (counties only), and transportation. The general nature of these elements is summarized as follows:

- **Land Use Element:** This segment of the plan defines the distribution and location of general land uses, population densities, and ground water/runoff patterns and protection strategies. This plan estimates future growth, and describes the desired pattern of land use in the community, as defined by the vision or goals of the community. The community land use vision described in this element provides the basis for the development of the transportation system.

- **Housing Element:** This element would include an evaluation of the existing housing inventory and projected needs, the definition of housing-related goals and policies, and identification of appropriate land for housing.

- **Capital Facilities Element:** All capital facilities are identified and inventoried. Forecasts of future facilities needs are made, proposed locations and capabilities of those facilities are indicated, and a six-year financing program is defined. The proposed land use plan may be modified depending upon the availability of facilities funding. The transportation system is a key element of a community's capital facilities.

- **Public Utilities Element:** An inventory of all public facilities, including location and capabilities, will be made. Because transportation systems and public utilities often share rights-of-way, there is a need to coordinate development of each component.

- **Rural Element:** The rural element describes land uses in rural areas that are not otherwise considered to have an urban, agriculture, forest, or mineral designation.

- **Transportation Element:** The transportation planning element is based upon, and must be consistent with, the desired land uses specified in the land use element. This element includes the following sub-elements and tasks:

- *Land Use Assumptions*
  Identify present and desired land uses;
  Develop population and business estimates (size and location)
- *Community Transportation Level of Service Standards*
  Coordinate service standards across political boundaries
- *Inventory of Existing Services and Facilities*
  Include all transportation modes
- *Current and Future Deficiencies*
  Compare future demand with future services;
  Identify desired strategies to solve shortages
- *Analysis of Financing*
  Estimate expected funds;
  Develop multi-year financial plans;
  Compare desirability of increased funding vs. changes in land use assumptions
- *Reevaluation and Concurrency*
  Adopt ordinances to enforce concurrency;
  Perform periodic re-evaluation of service standards, community vision, and land use assumptions
- *Action Strategies*
  Identify and summarize all components of the strategy;
  Define transportation improvement techniques to be used, including low-cost system efficiency improvements, transportation demand management, and system expansion
- *Intergovernmental Coordination*
  Evaluate regional effects of community plans;
  Participate in coordinating activities and organizations

The GMA also provides for impact fee and real estate excise tax options to help cities and counties fund public infrastructure needs generated by new development, as well as administration grants, technical assistance, and mediation support. To encourage regional coordination, the creation of Regional Transportation Planning Organizations (RTPOs) are authorized to help ensure regional conformance with state requirements, and to perform and designate lead planning responsibilities.

The GMA legislation included the formation of a Growth Strategies Commission to recommend specific measures that build upon provisions of the Growth Management Act. In October of 1990, the final report of the Growth Strategies Commission made further recommendations on the following issues:

- Coordinated growth planning
- Protection of the environment
- Protection of greenbelts/greenways and prevention of sprawl
- Protection of agricultural and forest lands
- Preserving significant lands and resources
- Sharing economic growth
- Developing urban growth areas and providing services
- Providing affordable housing
- Linking land use and infrastructure (e.g. transportation)
- Resolving NIMBY (Not In My Back Yard) issues
- Compliance

The report directly addressed the linkage between land use and transportation by advocating, among other things, an implementation approach that uses state leadership and leveraging of transportation network funding and development to provide incentives toward progressive, coordinated, regional growth management.

The 1991 Legislature passed additional legislation (HB 1025) to supplement the GMA. This legislation defines comprehensive plan requirements associated with the siting of essential public facilities, protection of sensitive areas and resource lands, county-wide planning policies that cover incorporated and unincorporated areas within its boundaries, and state agency compliance with local comprehensive plans. The bill modifies the restrictions in the GMA that confine urban development to "urban growth areas", by allowing a separate category of mixed-use developments known as "fully contained communities" that may be approved even if they are not located in urban growth

areas. Also added are regional hearing boards to resolve disputes, reinforcement of the concept of "presumption of validity" of city and regional plans, and authority to the governor to withhold tax dollars to cities or counties that do not conform to the planning process. Additional funds are provided to assist with data collection and organizational costs.

The 1991 amendments also require three counties of the Puget Sound region (King, Pierce, and Snohomish) to coordinate their planning with one another through the comprehensive planning process. Current efforts of these counties to coordinate land use and transportation planning are also discussed in the Metropolitan and Regional Planning section of this white paper.

State and Regional Transportation Legislation and Ordinances

In addition to the legislation associated with growth management, other state bills, city codes, and county ordinances also highlight the relationship between transportation and land use. The following categories illustrate notable examples of this linkage:

Transportation Funding

Several recent state bills provide optional funding sources to communities and counties to enhance high-occupancy vehicle mobility and improve public transportation. These bills illustrate a potential leveraging technique that the state can exercise to encourage land uses that take transportation into account (e.g. link the availability of state transportation funding options to land use planning processes that support regional or state transportation interests). The following are examples of those funding options.

1. Engrossed Substitute Senate Bill 6358 provides additional revenue sources for state transportation funding, and gives local government the option to impose those taxes to fund transportation improvements. New revenues will come from such sources as the motor vehicle fuel tax, gross weight and additional tonnage permit fees, and the motor vehicle excise tax. Local options include a county fuel tax, vehicle license fee, commercial parking tax, and street utility charge. This bill also creates the Transportation Fund, a discretionary revenue source that provides dedicated dollars to transportation needs without being restricted by the 18th Amendment to the state constitution (which directed that major transportation revenues be used for "highway purposes").

2. Engrossed Substitute House Bill 1825 provides additional revenue sources for state transportation programs associated with high-capacity transportation, including passenger and freight rail, high-occupancy vehicle (HOV) support, and high-capacity transit. The bill allows local option taxes to support funding of HOV lanes and high-capacity transit, provides funding to support freight rail corridor preservation through the creation of an Essential Rail Banking Account, and supports studies of inter-city rail potential (e.g. AMTRAK) in this state.

Transportation Capacity Management

Additional state legislation and regional ordinances have been developed to ease transportation congestion and improve mobility by more efficiently managing the existing capacity of the transportation network. These measures are often initiated by concerns about energy consumption and environmental pollution as well as traffic congestion. In general, capacity management is accomplished by 1) encouraging use of higher-occupancy vehicles such as car pools, van pools, and buses (e.g. using service and price incentives), 2) reducing demand (by cost disincentives), 3) providing substitutes to travel (telecommuting, services by phone), or 4) redistributing the travel demand (flextime, reduced work weeks). These approaches, known collectively as transportation demand management (TDM), are particularly useful when system service improvements are needed but funds or rights-of-way to support capacity enhancements are not available. TDM techniques increase the useful capacity of the

existing transportation system by increasing the efficiency of each vehicle (e.g. encouraging HOVs) or reducing the overall demand for the system (e.g. reducing the need for trips). Of particular interest in this study is the combined use of demand management techniques and supportive site designs to encourage land uses and patterns that generate less travel demand and/or encourage more HOV usage.

Recent legislative approaches have 1) provided additional funding sources to enhance HOV service (buses, transit) and the supporting infrastructure, and 2) mandated reductions in the demand generated by employers, particularly in the number of commute trips taken by single-occupancy vehicles (SOVs). These ordinances not only illustrate the use of TDM techniques to better manage the transportation system, but are further examples of ways that government support of transportation improvements can be leveraged to encourage transportation-supportive and coordinated land uses.

A notable example of the TDM approach in this state is Second Substitute House Bill 1671, also known as the Commute Trip Reduction bill, which outlines a demand management program aimed at reducing automobile congestion, pollution, and energy consumption. In this program, counties with populations over 150,000, and all cities within such counties, are directed to prepare ordinances that require "major" public and private employers (100+ employees) to implement programs to reduce SOV commuting by their employees. Major employers would be required to develop programs with the goal of reducing the number of single-occupant commuter vehicles and vehicle-miles traveled (VMT) by 15 percent by 1995, 25 percent by 1997, and 35 percent by 1999, with credit given for existing TDM efforts.

An innovative TDM pilot program was initiated in October of 1991 on the University of Washington campus. The U-PASS program combines very low cost ($7-$9/month) unlimited-use bus passes to students, faculty, and staff, increased bus service to the campus, and flexible adjunct services including a guaranteed ride home subsidy and low-cost occasional parking privileges, with an eventual 60% increase in on-campus permit parking fares, to encourage transit commuting and reduce future parking needs.

Transportation Concurrency Ordinances

Among the provisions of the Growth Management Act (GMA) is the specification, by each community, of standards of desired levels-of-service for its transportation system; these standards are then used to evaluate the impacts of a proposed new development or land use. Furthermore, the GMA requires that significant impacts require "concurrent" mitigation by the developer. As defined by the GMA, concurrency refers to a commitment by a developer to maintain desired community levels of transportation service by completing sufficient transportation impact mitigation at the time of development, or providing a financial commitment to complete sufficient improvements within six years of development. The mitigation program may include enhancements to satisfy an increase in demand (e.g. capacity expansion or improved signaling operations), as well as other measures that effectively reduce the impact (e.g. TDM or transit service enhancement).

King County recently began an impact fee program, known as the Mitigation Payment System (MPS). This computerized system determines the appropriate allocation of development fees based upon the degree to which a new development contributes to traffic levels at sites where major county capacity improvements are planned during the next 10 years. These impact fees are paid at the time of permitting, and are intended to supplement public funds. The fee program also offers incentive credits to encourage public transportation improvements and affordable housing. This system supplements the existing Road Adequacy Standards (RAS) system, a site-specific impact fee program that is being extensively revised to include level of service standards and concurrency evaluations. The MPS system is being considered for adoption in the future by adjacent cities, as well as the WSDOT.

Another example of concurrent traffic impact mitigation may be found in the Snohomish County Code. Title 26B, also known as the "Road Ordinance", requires developers to provide information sufficient to evaluate traffic impacts at key nearby intersections, and to mitigate any impacts that reduce the performance at those intersections below a minimum specified level of service. The developer is required to offer specific mitigation measures to meet this level of service.

The city of Bellevue has also developed a traffic impact mitigation program that employs the concept of concurrency and links developer mitigation of traffic impacts with levels of service.

State Educational Programs

As part of a statewide inter-agency effort to develop training materials on implementation issues associated with the passage of the Growth Management Act and follow-on legislation, the WSDOT is developing a series of workshops that are intended to assist cities, counties and state agencies with the implementation of transportation-oriented features of the GMA. The first of five such workshops features the linkage between land use and transportation, and is being made available throughout the state.

IIb. Land Use Issues

This section describes ten attributes of land use codes and policies that are associated with land use and transportation linkages. The discussion of each attribute or theme begins with a description of the concept and its relationship to land use. This is followed by a summary of the concept's relationship to transportation issues. A brief synopsis of relevant codes in Washington state and elsewhere is then presented, followed by notable examples of existing or planned projects and code provisions that reflect this concept. More detailed descriptions of relevant codes are included in Appendix B.

A Brief Comment on Zoning and Planning

Before beginning a detailed discussion of land use attributes and policies and their relationship to transportation, a brief introduction to zoning and planning is presented to define basic concepts and common terms.

Zoning has been defined as "...the governmental regulation of the uses of land and buildings according to districts or zones. It is a means of insuring that land uses within the community are properly situated in relation to one another, that adequate space is available for various types of developments, and that the density of development in each area is held at a level which can be properly served by governmental facilities and will permit light, air, and privacy for persons living and working within the community." (Yearwood 1971, 16)

Much of the discussion of zoning that follows is in the context of larger planning issues. The following general definition of planning was proposed by prominent U.S. planner Earnest Alexander:

> Planning is the deliberate social or organizational activity of developing an optimal strategy of future action to achieve a desired set of goals, for solving novel problems in complex contexts, and attended by the power and intention to commit resources and to act as necessary to implement the chosen strategy. (Alexander 1986, 43)

Legal authority for zoning and planning is based on two "Enabling Acts" that were passed in the 1920s. The Standard State Zoning Enabling Act of 1922 authorizes local governments to "divide the land within their respective corporate boundaries into land-use districts and, within each district, to uniformly regulate the use of individual parcels of land and the height, bulk, area, and location of buildings." The Standard City Planning Enabling Act of 1928 provides "for preparation of a master plan for the physical development of land within the territorial jurisdiction of the local government. Upon adoption by a duly constituted municipal planning commission and the municipal legislature, the master plan becomes the municipalities official policy statement with respect to its physical development." (Tager 1973, 3)

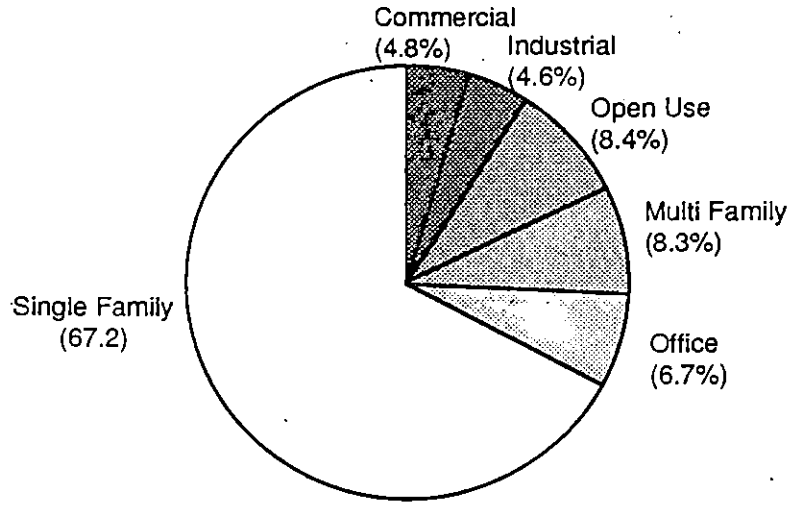


FIGURE 1. Allocation of Land Uses in Bellevue, Washington

Early zoning ordinances consisted of simple designations of zones: residential, commercial, industrial, agricultural, etc. As zoning and planning have become more complex, several zoning techniques have been developed which allow considerable flexibility and creativity in the application of zoning requirements:

Floating Zones: Floating zones are provisions that are described in the text of the zoning ordinance but are not mapped to a specific geographic area in advance. They "float" above the base zoning map and are applied in response to specific development proposals.

Overlay Zones: Overlay zones are special designations, containing additional standards and requirements, which are applied on top of a basic zoning classification. In contrast to floating zones, the areas or features to which these additional regulations apply are usually identified and mapped in advance, where appropriate, according to specific criteria. When applied, the standards of the overlay zone supplement those of the underlying zone.

Incentive Zoning: Incentive zoning provides an optional building bonus to developers, usually in the form of an increase in density in exchange for the provision of amenities, design features, public improvements, low or moderate income housing, open space, or other community benefits. Incentive zoning is used in many zoning codes throughout Washington.
(Definitions based on the Washington state publication A Short Course of Local Planning)

The rationale and application of these techniques will be discussed in greater detail elsewhere in this section.

Within a jurisdiction (city or county) zoning is the primary method of controlling the quality and quantity of development. Although Comprehensive Plans and other similar documents describe goals, policies, and objectives for the city or county, it is the zoning map and zoning code that is the most direct means of actually implementing overall planning goals.

Some communities also monitor the the allocation of land uses that result from zoning ordinances. The City of Bellevue documents the percentage of land in their city that is devoted to various general categories of zoning classifications. These are relative percentages of use of primary land use types that are permitted by various zoning classifications throughout the city (see figure 1).

Residential Density

Residential Density and Land Use Policies

The term residential density is typically used by urban planners to refer to the number of dwellings per unit of area. Alternatively, the population density of any jurisdiction is simply the total population divided by the total land area. Table 1 compares the three largest Washington cities (Seattle, Tacoma, and Spokane) with other major U.S. cities. The densities of Northwest cities are seen to be relatively low when compared to large eastern cities.

In addition to these density measures, other residential density metrics are also used in urban and transportation planning. In typical land use regulatory policies, for example, residential densities are generally specified in terms of a **minimum lot size per dwelling unit**, or its inverse, **the maximum number of units per acre.** Either measurement may be used to specify the maximum residential density that is allowed by a particular zoning code. For example, the Single Family (R1) zone in Spokane allows a maximum of 6 units per acre, which translates into an average minimum lot size of approximately 7200 square feet (this is a net residential density that excludes those areas such as roads and sidewalks that are not actually developed for residential units). Figure 2 shows the R1 zone and other residential zones in one area of the existing Spokane zoning map.

In a broader international comparison, U.S. cities as a whole are characterized by relatively low population densities. In Cities and Automobile Dependence, Newman and Kenworthy found major U.S. cities to be approximately one-third the population density of Toronto, one-fourth the population density of major European cities, and less than one-tenth the population density of large Asian cities. Other studies have also documented the strong trend in the U.S. toward low density residential development. According to U.S. planning historian Kenneth T. Jackson, low density residential development and suburbia in general, represent "the quintessential physical achievement of the United States". In his 1985 book Crabgrass Frontier: The Suburbanization of the United States, Jackson noted:

> The first distinguishing element of metropolitan areas in this nation is their low residential density and the absence of sharp divisions between town and country. In all cultures, the price of land falls with greater and greater distance from city centers. Thus, the amount of space devoted to a single dwelling will always logically be greater on the periphery than at the center. In international terms, however, the structure of American settlement is loose, the decline in density (the density curve) is gradual, and land-use planning is weak. (Jackson 1985, 6)

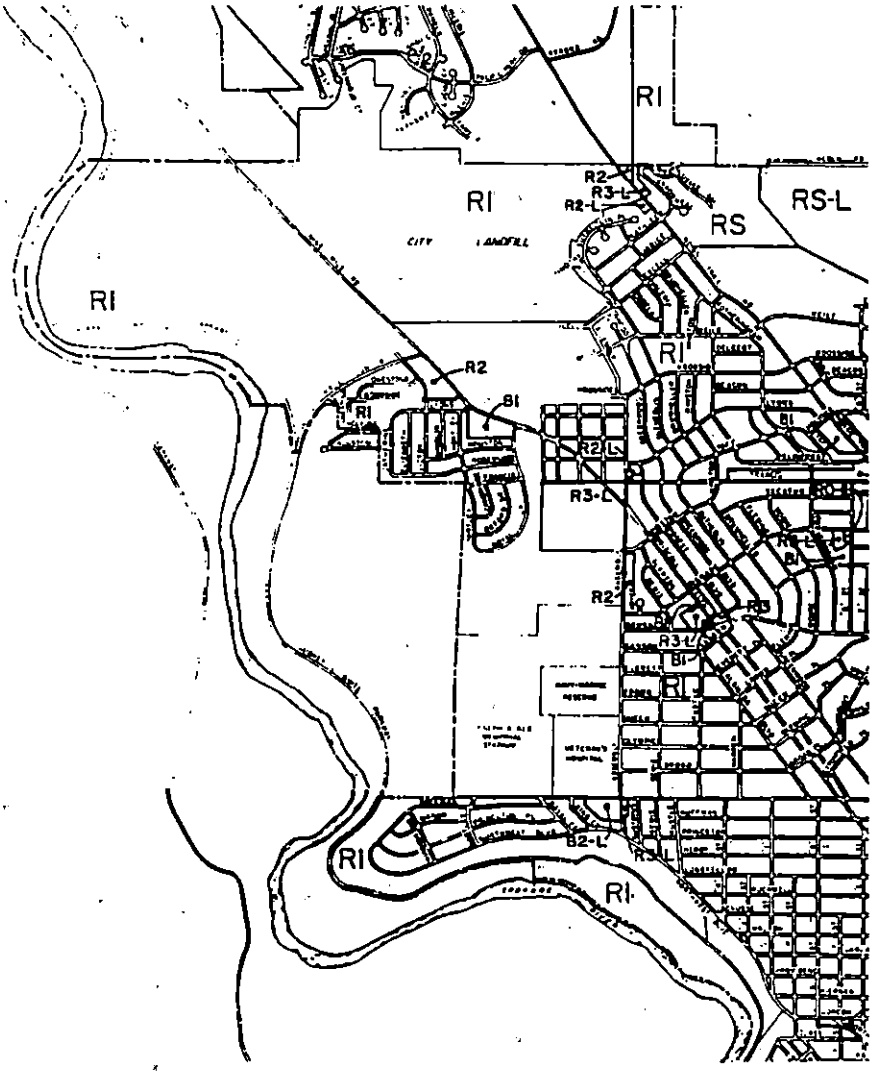


FIGURE 2. Spokane Zoning Map - Residential Zoning Example

Higher residential densities may be perceived as being correlated with a host of physical and societal attributes. Development proposals which increase residential density are often viewed as reducing the "quality" of the surrounding neighborhood. A recent study indicates, however, that these perceptions are a response not to density per se, as measured by dwellings per acre, but to certain design characteristics that typically accompany higher density developments, and that these attributes need not be an inherent component of increased residential density. In a 1990 article published in the Berkeley Planning Journal, James Bergdoll and Rick Williams summarized the results of a survey which attempted to evaluate the perception of residential densities relative to actual densities along three older residential streets in San Francisco: Francisco Street (35 dwelling units per acre), Florida Street (41 dwelling units per acre), and Greenwich Street (47 dwelling units per acre). In their article entitled "Density Perception on Residential Streets", Bergdoll and Williams made the following observations which indicate that the perception of residential density is influenced by the design of housing developments:

> Density is an important quality and factor in planning today. Planning departments use density to control and evaluate

TABLE 1: Gross Population and Housing Unit Densities for Selected U.S. Cities

City	Population Density (Persons/mile^2)	Residential Density (Housing units/mile^2)
New York City	24,089	10,023
Chicago	13,194	5,242
Boston	12,153	5,297
Los Angeles	6,996	2,760
Seattle	5,816	2,910
Tacoma	3,325	1,552
Spokane	3,104	1,446
San Diego	3,086	1,259

(County and City Data Book 1986)

development. Developers strive for densities which create an adequate return on their investment. The public often judges projects based on common values about appropriate densities. Anything higher than 'low density' is usually seen as 'too dense'. But is density, measured as dwelling units per acre or floor area ratio, really the important quality of the built environment?...Three physical characteristics seem to be very strongly associated with perceptions of lower density: 1) less facade area or smaller buildings; 2) greater building articulation (that is, recesses between the buildings and variations in the facade plane, and, 3) a greater number of 'house-like' dwellings (e.g. with gable roof). These characteristics varied directly with the rankings of density and were mentioned by many of the respondents as reasons for their ranking.(Bergdoll and Williams 1990, 15-16)

Bergdoll and Williams went on to summarize the current controversy surrounding residential density in U.S. cities:

> Density is a controversial and important topic because many people have a very negative impression of dense places. These people may not be objecting to or running from the density itself, but from its perceived correlates - for example, higher crime rates, visual clutter, less privacy, often dull or ugly architecture, or lower socioeconomic conditions. Our research project focused on possible correlates relating to the physical design of streets and attempted to determine what people are looking at when they make judgments about densities... Conflicting with the apparently widespread preference for lower density are the problems associated with low-density development. There is a growing acknowledgement that the current pattern of sprawling development is an inefficient use of our resources and is expensive to build and maintain...Housing at higher densities could be achieved with minimal changes in desirability or perceived crowding, and would conserve natural resources and reduce housing costs. If new residential developments were designed to appear less dense, people might accept higher density development more readily (Bergdoll and Williams 1990, 17).

Residential Density and Transportation

One of the early studies which analyzed residential densities relative to transportation systems was the 1977 study Public Transportation and Land Use Policy by Boris Pushkarev and Jeffrey Zupan. This research concluded that transit's ridership share increases as residential density goes up, and that minimum thresholds of residential density are needed to support specific forms of public transportation (e.g. local bus service, light rail, etc.). In addition, Pushkarev and Zupan noted that transit ridership was also

dependent upon the size of the residential area, its proximity to employment centers, and the quality of the transit system itself. Of particular note is their conclusion that 7 dwelling units/acre is a minimum threshold for successful local bus service, a figure that has been reported extensively in other studies and planning efforts. A further discussion of their results is presented in Appendix C.

In 1979, the Tri-County Metropolitan Transportation District of Oregon ("Tri-Met") published a reference entitled Planning With Transit: Land Use and Transportation Planning Coordination. Tri-Met's service area includes Vancouver, WA and northern Oregon, as well as major cities within the Oregon counties of Clackamas, Multnomah (including Portland and neighboring Gresham), and Washington. Tri-Met planners described the relationship between varying residential densities and land forms in Portland and the ability of such densities to support transit service, in the following way:

> The older sectors in the region (S.E. Portland and N.E. Portland), contain average residential densities of about 9 units per residential acre of land. Northwest Portland, near downtown, has an average density of about 15 units per residential acre. In these areas, the streets are generally in a grid/block pattern, with a consistent hierarchy of street types from local-to-collector-to arterial. These older land use forms were developed in an era when transit and walking were major modes. They are close to downtown and are characterized by relatively narrow streets with adequate sidewalks and close proximity to arterials."..."The inner urban areas described above can be contrasted to the suburban communities around Beaverton, Lake Oswego, North Clackamas County, and East Multnomah County. These areas have residential densities averaging only 3-5 units per residential acre. Those subdivisions developed in the '50s and '60s reflect the almost total dependence on auto travel. Many of them are characterized by winding looped or dead-end streets, and most are without sidewalks. Pedestrian travel is difficult, and frequent transit service can only be provided on the sparce major arterials. (Tri-Met 1979, 17)

Tri-Met studied the relationship between residential density and transit use by comparing pairs of census tracts that had similar total populations and transit service levels, but dissimilar residential densities. A summary of their findings is shown in Table 2. In general, an increase in residential density measured in dwelling units per acre (DU/acre) is positively correlated with transit ridership measured in Riders per day per 1,000 population.

The relationship between residential density and transportation was also recognized by the Seattle "Mayor's Advisory Forum on Balanced Growth". In a 1989 report, the Advisory Forum determined that the second most important strategy for addressing the complex problem of defining Seattle's role within its region, should be to "concentrate more growth in Seattle." The Advisory Forum recommended that Seattle:

> Increase the number of housing units in residential areas in a manner that maintains the character and quality of Seattle's neighborhoods. Consideration of increased densities could be conducted through a new neighborhood planning process...

The Advisory Forum described the rationale for encouraging higher residential densities:

> The Advisory Forum sees several important benefits to concentrating growth in existing urban centers. It will encourage the development of mass transit solutions to solve the County's transportation problems.....As the major urban center of King County, Seattle should consider increasing current residential housing densities. City officials must work to balance the interests of individual neighborhoods with county-wide interests. (Advisory Forum on Balanced Growth 1989, 49)

TABLE 2. Relative Effect of Density of Transit Ridership

Census Tract	Buses/Hour (peak)	Distance to CBD (miles)	Residential Density (DU/Acre)	Riders per Day	Riders per Day
31	14	5.0	8.7	554	123
67.01	17	4.5	4.6	208	76
42	15	8.0	11.1	460	158
97.02	15	11.0	5.2	398	60
314.02	25	7.0	14.6	148	135
303	25	5.0	3.6	232	47
224	12	12.0	6.4	503	126
98.02	12	11.0	4.6	355	58
76	9	5.5	8.2	230	74
202	11	7.5	3.2	383	39

(Source: Tri-Met, Planning with Transit 1979, p.22)

Residential Density: An Overview of Land Use Policies

The following summary is an overview of the ranges of residential densities which are allowed in typical Washington state zoning codes (agricultural zones allowing residences are not included in this analysis).

Densities range from a low of 0.1 units per acre in the Rural Residential zone in Spokane County and the Suburban Cluster (SC) zone in King County, to a high of 145 units per acre in the Residence Highest Density (RMV 150) zone in Seattle (an even higher density of 195 units per acre is permitted in this zone if the project also includes low income, elderly housing).

Typical lot sizes for single family zones range from 5,000 sq. ft. to 15,000 sq. ft. This range of lot sizes includes 77% of the single family residential zones included in this study. These lot sizes represent a range of net densities from 2.9 to 8.7 units per acre.

Typical densities for multi-family zones range from 10 to 54 units per acre. Approximately 85% of the multi-family residential zones included in this study are within this range. Only Seattle and Spokane permit multiple-family residential densities to exceed 100 units per acre.

All but one of the 14 study jurisdictions also have provisions for residential developments known as Planned Unit Developments (PUDs). While different jurisdictions use different names such as "Planned Developments" or "Planned Overlay Zones", the PUD concept generally refers to a "floating" zone which places special requirements on a development; in addition, if amenities are provided by the developer, the zoning provisions may offer in exchange a density bonus over and above the allowable base density of the underlying zone. Eight of the 13 jurisdictions with PUD provisions allow an increase in residential density under such a bonus system. Because PUDs are related to a number of other important land use-transportation concepts, a separate discussion of the PUD approach to residential density and amenities is described in the section titled Master Planned Developments.

Residential Density: Notable Policies and Projects

King County

The 1985 King County Comprehensive Plan defines "Urban Areas" as

defined regions in which the county "should seek to achieve an average density of 7 to 8 dwelling units per acre in the portions of the Urban Area that are undeveloped, are served or can be served with adequate services, and are free of physical constraints". The Comprehensive Plan further specifies the following desirable residential density goals, based on the level of street access:

a. Residential development at 3 to 8 units per acre should be convenient to a neighborhood collector street
b. Residential development at 8 to 12 units per acre should be convenient to a collector arterial
c. Residential development at 18 to 30 units per acre should be convenient to a minor arterial
d. Residential development at 18 to 30 units or more per acre should be convenient to a principal arterial, unless it is within Urban Activity Centers, Community Centers, or Neighborhood Centers where the area-wide pattern of roads and transit service provides adequate access

Spokane County

Spokane County includes a unique bonus provision within their zoning code which allows higher densities within the Urban Residential zone (UR-22) in order to "provide for higher density development in locations close to employment, shopping, major transportation routes and the sanitary sewer." The following density bonuses are granted in addition to the base density of 22 units per acre that is allowed by the underlying zone:

a. "Three and one-half (3.5) units per acre for direct hookup to the Sanitary Sewer prior to occupancy...
b. "One-half (.5) unit per acre for location of development within one-quarter (1/4) mile walking distance of available public transit...
c. "One-half (.5) unit per acre for location of development where off-site convenience shopping facilities are functionally accessible within reasonable walking distance (approximately one-half mile)...
d. "One-half (.5) unit per acre for primary means of access to the development is via an arterial."

This example from Spokane County introduces several land use-transportation linkage concepts such as the use of residential density incentives to encourage pedestrian-friendly site design and attractive transit service, developing a mixture of nearby land uses (e.g. shopping) to reduce automobile trips, and encouraging site designs that improve access. These concepts will be discussed in more detail later in this report.

Master Planned Development: Laguna West

An unconventional residential commuity being developed in Laguna West, California establishes residential density zoning based on the proximity to a central Town Center which includes a transit station. Residential densities average 20 units per acre in areas close to the Town Center, with an overall average of 14 units per acre for the entire development. This overall density is claimed to be approximately twice the residential density for other new suburban subdivisions in northern California (Gordon and Peers 1991). The Laguna West project and other so-called Master Planned Communities are discussed in greater detail in the section Master Planned Developments.

Transit Districts: Gresham, OR

Some jurisdictions have implemented zoning policies which encourage an increase in residential densities in very specific locations. For example, Gresham, OR has established a "Transit Overlay District" zone which controls the development around existing TRI-MET MAX light rail transit stations. This zone allows a maximum of 60 dwelling units per acre near these stations.

Seattle

Public acceptance of higher residential densities, and the importance of good design and citizen participation in the process of developing more compact urban residential neighborhoods, is of special interest in Seattle as the city now considers new design review procedures for higher density housing. In October, 1990 a steering committee was formed to develop a design review process for

all multi-family housing developments in Seattle. The steering committee consists of planners, architects, citizens, developers, representatives of low income groups, and public officials, and will develop a process that emphasizes neighborhood participation in the review of new developments; the new process was expected to be initiated in early 1992. On a related note, in August, 1991 a group of community leaders from Seattle visited Vancouver B.C. in an "intercity visit" sponsored by the King County Housing Partnership and Greater Seattle Chamber of Commerce. The theme of the visit is "density by design", or "how to build affordable, dense housing that the region's development-wary towns and neighborhoods will accept." King County Housing Partnership executive director Marcia Gamble Guthrie states that "I think what it's going to take is for people to be able to see housing density as a positive thing", and that she sees the trip as an opportunity to, "enrich the debate about growth management and land-use planning around Puget Sound." (Flores 1991, E-1)

Employment/Activity Center Density

Employment/Activity Center Densities and Land Use Policies

The term "employment center" was developed by University of California at Berkeley professor Robert Cervero to describe "a massing of workers" such as a traditional downtown, a college or university campus, a manufacturing or industrial complex, or a suburban office park. The more general "activity center" includes not only employment centers, but shopping centers, sports stadia, and other similar complexes as well.

While activity center densities are generally measured by employment population density, a common surrogate measure is the building floor area (it is assumed, therefore, that the number of employees is directly correlated with the amount of available floor space). Employment and activity center densities are generally specified in land use codes in one of two ways: either a combination of maximum lot coverage, minimum setbacks, and maximum height is specified, or a maximum floor area ratio (FAR) is specified, where FAR is defined as the allowable ratio of the total building floor area to the total area of the site (see figure 3). As an example, the Business District (B) zone in downtown Tacoma allows a FAR of 15, while the Light Manufacturing (LM) zone in King County allows a FAR of 2.5.

Activity centers are no longer solely associated with the central business districts of major cities; the development of suburban activity centers has accompanied the "suburbanization" of residential areas around many American cities. Cervero has described this trend toward decentralized urban development as a series of three "waves" that are strongly tied to transportation systems:

> The migration of traffic jams to the suburbs has followed on the heels of what some have called America's 'third wave' of suburbanization. The first wave involved the mass movement of middle-class and upper class residents to the outskirts of cities throughout the 1900s in search of spacious living conditions and detached, single-family homes. The construction of inter-urban streetcar lines and modern motorways literally paved the way for the exodus... The second wave of decentralization, which occurred primarily during the three decades following World War II and continues today, witnessed the migration of commercial and industrial activities to the outskirts, attracted to the vast reservoir of potential consumers and workers living in the suburbs...The third wave of suburban expansion - the arrival of workers, particularly those in the office and high technology sectors - has brought American suburbs full circle. With the addition of a day-time workforce population, many suburbs have become virtually indistinguishable from traditional urban centers.....Unfortunately, suburbs have also suffered many of the ills that accompany maturation, most notably traffic congestion! (Cervero 1988a, 2)

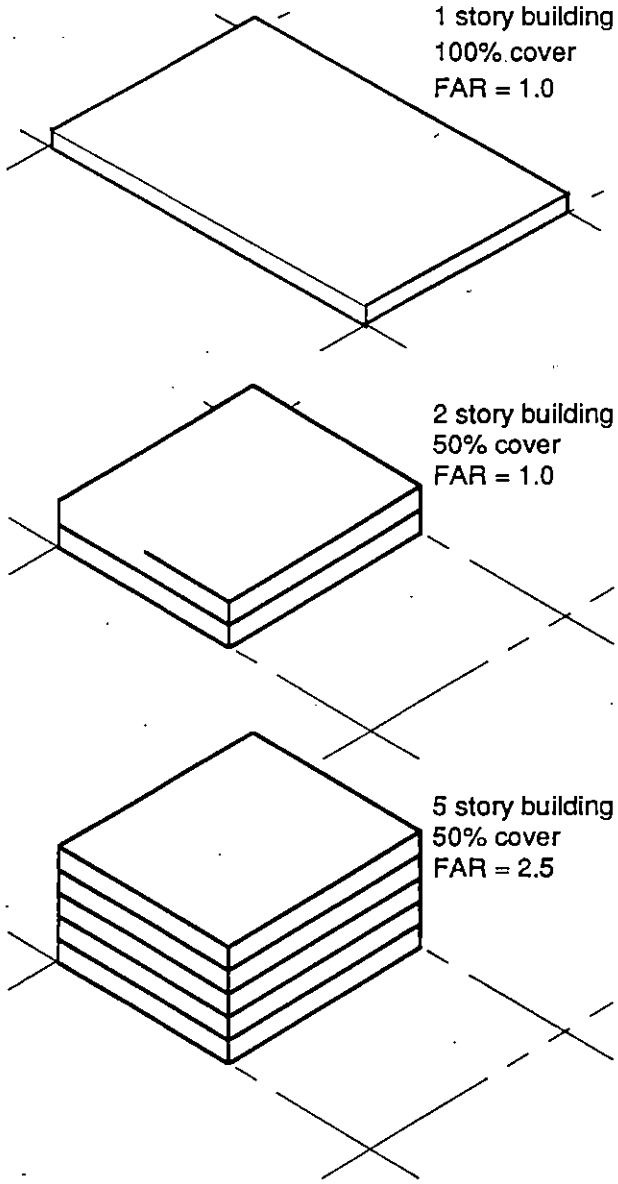


FIGURE 3. Floor Area Ratio (FAR) Concept

Cervero also summarized previous studies which documented the growth of suburban employment centers:

> The pace of suburban employment growth has been phenomenal. In 1980, 57 percent of all office space in the U.S. was located in urban centers and 43 percent in the suburbs; by 1986, the situation was reverse – 60% was in the suburbs, compared to 40 percent in cities... (Cervero 1988a, 2)

Employment/Activity Center Densities and Transportation

In his book America's Suburban Centers: A Study of the Land Use-Transportation Link, Cervero's research of the employment patterns and transit usage of 57 suburban employment centers revealed a strong relationship between the density of the employment center and the utilization of carpooling and transit. Cervero cited 1987 research by the Chicago Area Regional Transit Authority which noted that an FAR of 2.0 or above should be considered as a minimum threshold of employment center density to support transit service. An earlier study for Seattle METRO in 1978 by the planning/engineering firm of Parsons Brinckerhoff Quade and Douglas Inc. analyzed transit ridership to six activity centers in the Seattle area. These activity centers (the Seattle and Bellevue Central Business Districts, the University District and the University of Washington, the Denny-Regrade-Seattle Center area, Northgate, and Southcenter) include a wide range of employment centers, retail areas, and shopping centers. Their study results supported the notion that there was a relationship between an increase in the density of the employment center and an increase in transit ridership share. The study also noted that the overall size of the activity center was as important as its density. Thus, a high employment density and an activity center population that exceeds some minimum threshold of size were both necessary conditions for effectively enhancing public transit use. An additional, similar analysis of transit ridership relative to employment center density was prepared by METRO in 1985. Once again, transit ridership was strongly correlated with increased density of employment centers in Seattle and Bellevue. These findings are summarized in Table 3.

Employment/Activity Center Densities: An Overview of Land Use Policies

Within the 14 study jurisdictions, FARs for office, office park, industrial park, and industrial land use zones ranged from 0.5 to 15. FARs of 2 to 2.5 are typical in manufacturing and industrial zones; in King

County, for example, a maximum FAR of 2.5 is allowed in the Light Manufacturing (ML), Manufacturing Park (MP), and Heavy Manufacturing (MH) zones, while Seattle's zoning code also allows a maximum FAR of 2.5 in the Industrial Commercial (IC), General Industrial (IG1 and IG2) and Industrial Buffer (IB) zones.

With the exception of central business districts in cities, most jurisdictions do not define or limit density directly by specifying a FAR. Instead, most zoning codes indirectly control density through the alternative specification of maximum lot coverages and height caps. In these cases, an estimated equivalent FAR may be calculated based on the allowable lot coverage if we assume typical 10' heights per floor for office occupancies and 15' heights per floor for industrial occupancies. Using this method, these estimated FARs generally ranged from 1.0 to 3.0, with many between 1.0 and 1.5. It is apparent that the jurisdictions that do not specifically define floor area ratios tend to zone at densities somewhat lower than those jurisdictions which specify FARs.

Tables 4 and 5 summarize the actual or estimated activity center FAR code provisions for commercial, CBD, industrial, and office park zones.

Due to the use of estimated equivalent floor area ratios in the absence of explicit values in the code, the findings summarized in these tables are not conclusive; this is especially true given that the overall employment density of a large center, not just individual project densities, determines its ability to support public transportation services. Note that while it appears that the allowable floor area ratios for employment or activity centers generally exceed the FAR range of 2.0 cited by Cervero from the research of the Regional Transportation Authority as being supportive of transit, Cervero's research of 57 suburban employment centers also found actual built densities to be only one-half the allowable densities in the code. While an evaluation of built densities compared to allowable code densities is beyond the scope of this research phase, it may be surmised that employment and activity center densities are directly affected by the large parking requirements which tend to "force" the building to occupy a small percentage of the total site, with large areas of parking surrounding the building. Further research is needed to determine whether parking requirements and other factors (including land values) lead to built densities that are less than what is allowed by zoning regulations.

Employment/Activity Center Densities: Notable Policies and Projects

Toronto

In his 1986 article "Urban Transit in Canada: Integration and Innovation at its Best", Cervero reviewed the success of public transportation systems in major Canadian cities and noted that "the overriding factor behind transit's success in Canada is, plain and simple, the superior levels of service, combined with the careful integration of transit and land-use planning." Cervero highlighted the success of the Scarborough Town Centre near downtown Toronto. Scarborough Center is an employment center of 6,000 workers that is linked by an advanced light rail transit (ALRT) system to central Toronto. To encourage high density development that in turn supports transit service, building sites close to the ALRT station are zoned at a FAR of 4. Recent estimates of transit ridership share for Scarborough are 75% for workers and 60% for shoppers. The success of transit ridership to this employment center has not come at the expense of transit ridership to downtown Toronto: 75% of peak trips to downtown Toronto were also via transit, with a 74% farebox recovery rate (Cervero 1986).

TABLE 3. Transit Ridership vs. Residential and Employment Density

		Non-Residential Area									
		Downtown Core		Regrade/ Seattle Center		University District		Bellevue		Northgate, Southcenter, Federal Way	
Employees/Acre		500		150		60		60		15	
Parking Costs/Day		$6.00		$4.00		$2.00-$4.00		$0.50		$0	
Residential Area	**UPA**	**DWT**	**MS**	**DWT**	**MS**	**DWT**	**MS**	**DWT**	**MS**	**DWT**	**MS**
Queen Anne	7-15	5600	55%	2300	30%	2000	15%	400	6%	500	10%
Rainier	3-7	8000	50	2400	35	2600	30	600	6	1500	10
E. Bellevue	1-5	3300	40	1200	25	1700	30	3800	6	1100	2
Fairwood/ S.Kent	1-5	1500	30	600	20	700	10	800	1	2900	2
Federal Way	2-4	30000	50	900	35	900	20	400	0	3100	2
Northshore/ Kingsgate	1-5	3000	40	1300	25	2500	15	2300	5	1000	3
All Areas		130,900	40	46,700	22	68,100	18	29,600	4	45,500	4

DWT Daily Work/College Trips
MS % Transit Work Trips
UPA Units per acre (approximate 1985 ranges) (Source: City of Seattle OLP 1989, 36)

TABLE 4. Highest Values of Maximum Floor Area Ratios for Selected Zones

Zones	Cities	Counties
Regional Commercial/Retail	6	3.5
Downtown CBD Zones	15	NA
Light Industrial	10*	2.5
Heavy Industrial	10*	2.6
Office and Industrial Park	1.8	2.5

Note: NA = Not Applicable: County Zoning Codes do not include CBD zoning designations (typical)
* Exceeds next highest industrial FAR by 6.0

TABLE 5. Lowest Values of Maximum Floor Area Ratios for Selected Zones

Zones	Cities	Counties
Regional Commercial/Retail	4	2
Downtown CBD Zones	1.0	NA
Light Industrial	1.6	1.3
Heavy Industrial	2.5	2.5
Office and Industrial Park	1.5	1.5

Portland/Gresham, OR

Development zoning of activity centers is usually specified in terms of a maximum allowable density, primarily in response to concerns about the perceived visual bulk of buildings, and overcrowding. Portland, however, has established a Light Rail Transit Station Zone (an overlay zone), that specifies a range of minimum allowable FARs, "to create a more intense built-up environment, oriented to pedestrians" (Portland Land Use Code Section 33.450.205). In this case, the seemingly mundane and technical specification of a minimum floor

area ratio (i.e. density) can address a major linkage between land use and transportation by encouraging employment densities that support transit use. Similarly, Gresham's Transit Development District zoning near transit stops also specifies minimum FARs and explicitly recognizes transit linkage. The Transit Development District "is intended to promote development that makes effective use of its close proximity and accessibility to the light rail stations and to established intensive retail, service, office and residential uses in these areas." (Gresham Land Use Code Section 2.0430)

King County

The 1985 King County Comprehensive Plan acknowledges the need to specify locations and general guidelines to foster the development of Activity Centers:

> The plan (comprehensive plan) envisions groupings of commercial and industrial uses in centers throughout King County in cities and unincorporated areas, providing jobs, and goods and services close to where people live. For Urban Areas, the plan concept envisions major concentrations of employment and trade, called Urban Activity Centers; and many small concentrations of retail stores in Neighborhood and Community Centers. In Rural Areas, commercial and industrial activities are concentrated in the Rural Activity Centers.
>
> Centers of economic activity with a mix of stores and services, offices, and research and manufacturing industries serve both public and private interests. Compact groupings of uses encourage transit and pedestrian travel, and reduce conflicts with neighboring uses. For example, Metro has found that an employment density of about 50 jobs per acre in large concentrations is needed to support a high level of transit cost-effectively....(King County Comprehensive Plan 1985, 87)

Parking Requirements

Parking Requirements and Land Use Policies

Typical parking requirements for a particular type of activity (e.g. professional office, retail, manufacturing, etc.) are usually expressed in terms of the minimum number of off-street parking spaces per gross square footage of building floor area. For example, the city of Vancouver, WA requires a minimum of 1 parking space per 400 gross square feet (sf) of floor area for business and professional offices located outside of the CBD, while 1 parking space per 1000 sf is required within the CBD (the distinction between CBD and non-CBD locations is common in land use codes). A more recent trend is to also specify a maximum number of allowable off-street parking spaces; this policy trend is discussed in detail later in this section.

Another element of parking requirements is the associated price of parking. Not surprisingly, the supply of parking (as measured by both availability and affordability) has been found to be positively correlated with the demand for parking. Parking requirements in the context of land use policies were studied in the late 1970s by UCLA professors Donald Shoup and Donald Pickrell. Their research summarized important relationships between parking supply, parking price, and transportation mode choices. Their findings are discussed later in this section.

In their 1989 book Cities and Automobile Dependence, Newman and Kenworthy described an international study of the effects of transportation systems and urban densities on automobile dependence. Their research concluded that U.S. cities provide an average of 380 parking spaces per 1,000 CBD workers, while Australian cities provide an average of 327 spaces per 1,000 CBD workers, Canadian cities (Toronto only) provide 198 spaces per 1,000 CBD workers, European cities provide an average of 211 spaces per 1,000 CBD workers, and Asian cities (Tokyo, Singapore and Hong Kong) provide an average of 67 spaces per 1,000 CBD workers (Newman and Kenworthy 1989, 41).

In addition to the direct relationship between parking requirements and transportation systems which will be discussed later in this section, parking policies are also a determinant of the overall form and character of an individual development or entire city. When asked to describe the role of parking within the urban design program for the city of San Diego, assistant city architect Paul Curcio noted that "parking is the fulcrum because urban form follows parking" (Swanson,1989).

Parking Requirements and Transportation

Parking Prices and Travel Behavior

Two 1969 studies of travel behavior in Southern California conducted by Groninga and Francis found that travel behavior was strongly correlated with parking prices. In one case study of employees at various locations in Century City, those who were charged for parking at their work place were 3

TABLE 6. Summary of Findings (Percentage of activity centers offering each feature)

SAC or CBD	Residential Bus Service	Shuttle Bus Service	Passenger Rail Service	Employer Transit Subsidies	Transit Use Incentives
SAC	59.0%	40.4%	28.6%	31.1%	59.6%
CBD	60.0%	83.3%	68.4%	82.4%	78.6%

(Joint Center 1989, 47)

times as likely to ride the bus, carpool, or walk as those who received free parking (Shoup and Pickrell 1978, 559).

Yet despite the high land prices (and therefore high costs of developing lots) in most large cities, a recent study by the Center for Urban Transportation Research documented that 90 percent of American workers who are employed in large metropolitan areas are able to drive to work and park without charge. This appears to be a result of employer-subsidized parking as well as land use (zoning) policies that continue to require excessive levels of parking. As Shoup and Pickrell noted:

> Zoning ordinances requiring the provision of off-street parking for new buildings have existed since the 1920s. The usual intent is that the problem of traffic congestion in activity centers can be alleviated by accommodating in off-street facilities the peak number of automobiles that are drawn to a site. This attitude is best exemplified in a 1970 study by Witheford and Kanaan, who assert: 'The zoning ordinance that confers the greatest benefit in preserving street capacity is probably that requiring new activities to provide parking off-street. (Shoup and Pickrell 1978, 547)

Built Parking Supply vs. Actual Parking Needs

In his 1988 publication America's Suburban Centers, Cervero analyzed the supply of parking at 57 suburban employment centers, and determined that the average employment center included 3.85 parking spaces per 1,000 gross square feet of floorspace. Cervero cited other multi-state studies which also found similar ratios of parking spaces to gross floor areas at suburban office parks, notably Gruen Gruen + Associates (1986). This built supply was compared with studies cited by Cervero of "actual usage rates in California and Texas, (which) found suburban office workers only required around 2.2 spaces per 1,000 square feet" (Cervero 1988a, 41). Cervero noted the case of the Galleria office-retail complex in suburban Atlanta which was constructed in three phases. The first phase of the development included 4.5 spaces per 1,000 sq. ft. After observing the number of empty parking spaces that resulted, the parking ratio was lowered to 3.3 spaces per 1,000 sq. ft. in the remaining phases of the project, "saving millions in the process" (Cervero 1988a, 41).

Parking Supply and Travel Behavior

In 1989, an extensive analysis of suburban travel behavior at 64 U.S. suburban activity centers (SACs) and nearby central business districts (CBDs) was conducted by the Joint Center for Urban Mobility Research at Rice University. When comparing suburban centers and CBDs, this research revealed a strong correlation between usage of transit and parking. Parking spaces at the SACs averaged 3.7 spaces per 1,000 square feet (with a high of 5.7 and a low of 0.3 per 1,000) while parking spaces at CBDs averaged 1.3 spaces per 1,000 square feet (with a high of 2.4 and a low of 0.8 per 1,000). In addition to these parking requirements, associated transit system or incentive programs were also analyzed; the results are shown in Table 6. The associated transit ridership share was between 2 and 5 percent in SACs and nearly 30 percent in CBDs. The single-occupant vehicle use rate, was similar in either case, however (62% in SACs, 70% in CBDs).

Parking Supply and Public Transportation

While it may be difficult to define "excessive" parking standards, large amounts

of parking are generally considered to deter the use of transit. Dense compact building arrangements (and resulting higher employment densities) are not possible if excessive off-street parking spaces are required; in addition, large parking areas tend to hinder pedestrian access from buildings to sidewalks and between adjacent buildings.

Parking Requirements: An Overview of Land Use Policies

Off-street parking requirements for the 14 sample jurisdictions were evaluated for retail, business and professional office, and manufacturing land uses. The required off-street spaces per unit of building floor area for each land use are noted as follows:

Retail

Parking requirements vary from 1 space minimum per 150 sf of floor area to 1 space minimum per 2500 net sf in areas with "high transit access" (Seattle CBD). The average requirement is 1 space per 455 sf; city codes average 1 space per 612 sf and county codes average 1 space per 330 sf (these calculations include CBD and non-CBD values and the maximum parking requirements where specified). A direct comparison of retail parking requirements is complicated by differences in nomenclature (e.g. the use of net and gross square footages), and the use in some jurisdictions of stepped requirements that vary with the size of the development.

Business and Professional Offices

Parking requirements vary from 5 spaces minimum per 1000 sq. ft. of floor area in King County, to 1 space minimum per 1492 sq. ft. in "areas with high transit access" (Seattle CBD). In general, the zoning codes require an average of 1 space per 350-400 sq. ft. of office space; the Spokane County, Seattle (non-CBD, customer service), Clark County, Pierce County, Bremerton, (customer service), Everett (non-CBD), Vancouver (non-CBD), and Spokane (ground floor offices) code requirements are all within that range. The average requirement is 1 space per 520 sq. ft.: the city codes average 1 space per 602 sq. ft. and the county codes average 1 space per 330 sf.

Manufacturing

As with the retail and office conditions, parking requirements for manufacturing developments vary over a broad range. Spokane County requires 1 space per 400 sq. ft. of building floor area while Seattle requires one space per 1500 sq. ft. of building floor area. Eight jurisdictions have requirements within the range of one space per 800-1000 sq. ft. The average requirement is 1 space per 827 sq. ft. Requirements for counties average 1 space per 660 sq. ft., and requirements for cities average 1 space per 931 sq. ft. Manufacturing is the only type of zone where codes tend to also consider the actual "employment" density or number of people actually working in the buildings. For manufacturing, 7 jurisdictions have established their requirements based on the number of employees on the maximum shift. The average requirement is 1 space per 2 employees.

The parking requirements of retail, business and professional office, and manufacturing areas are summarized in the following tables. In each case, values shown are in units of parking spaces/gross sq. ft.; for example, 1/200 = one space per 200 gross square feet.

This brief analysis illustrates the wide variety of parking requirements for retail, office, and manufacturing land uses across different jurisdictions in the state. Despite the existence of established standards and manuals, parking requirements appear to be based on a highly variable criteria of adequacy.

Most of the study jurisdictions express the parking requirement as a minimum, and maximum allowable spaces are generally not specified. However, both Bellevue and Seattle specify maximum allowable off-street spaces within their Central Business Districts. In addition, Bellevue specifies maximum allowable off-street spaces for certain non-CBD uses as well (this is discussed later in this section). As indicated by the results in Tables 7-9, cities tend to require less parking in the CBD compared to non-CBD areas, and for the three land uses included in this analysis, cities require less parking than the counties.

TABLE 7. Parking Code Summary for Retail Parking

	Cities	Counties
Maximum Parking Required (including CBDs)	1/200	1/150
Minimum Parking Required (including CBDs)	1/2500	1/350
Average Requirement (including CBDs)	1/612	1/330
Average CBDs	1/1401	NA
Average non-CBDs	1/415	NA

*Note: NA = Not Applicable: County Zoning Codes do not include CBD zoning designations (typical)

TABLE 8. Parking Code Summary for Business and Professional Offices

	Cities	Counties
Maximum Parking Required (including CBDs)	1/200	1/200
Minimum Parking Required (including CBDs)	1/1492	1/400
Average Requirement (including CBDs)	1/602	1/330
Average CBDs	1/948	NA
Average non-CBDs	1/436	NA

TABLE 9. Parking Code Summary for Manufacturing

	Cities	Counties
Maximum Parking Required	1/600	1/400
Minimum Parking Required	1/1500	1/1000
Average Requirement	1/931	1/660

Recently-passed House Bill 1671 will require major employers to institute demand management programs to reduce single-occupant vehicle commuting. If these measures are successful, this legislation may potentially lead to reductions in required minimum parking spaces for office and industrial occupancies as automobile commuting decreases (specific provisions of House Bill 1671 are discussed in the section entitled Transportation Programs). Reductions in parking requirements as a result of such legislation or ordinances will also result in more land available for adjacent complementary land uses that could reduce the number of trips generated, and allow higher-density, more transit-friendly developments that supports public transportation.

An interesting variant of the parking requirement issue involves the shared use of a single parking lot by two or more adjacent developments. This is especially feasible when adjacent developments have different and largely non-overlapping periods of operation (a common example is an office adjacent to a theater, where offices are largely populated during the day, while theaters are used primarily in evening hours). In fact, all of the 14 study jurisdictions do allow a reduction in parking requirements if a given

parking lot serves more than one development, and if the developments have staggered peak hours of demand (typically day vs. night uses of the same parking area). Snohomish County's Code includes a typical ordinance providing for a reduction in required parking for a joint use of a lot:

"18.45.070 Joint Uses: The planning director may, upon application by the owner or lessee of any property, authorize the joint use of parking facilities by the following uses or activities under the conditions specified herein:

"1) Up to fifty percent of the parking facilities required by this chapter for a use considered to be primarily a daytime use may be provided by the parking facilities of a a use considered to be primarily a nighttime use or vice versa, Provided that the reciprocal parking area shall be subject to the conditions set forth in SCC 18.45.080;

"2) Up to one hundred percent of the Sunday and/or nighttime parking facilities required by this chapter for a church or auditorium incidental to a public or parochial school may be supplied by parking facilities required for the school use. PROVIDED the reciprocal parking area shall be subject to the conditions set forth in SCC 18.45.080; and

"3) For purposes of this section, the following uses are typical daytime uses: business offices, barber shops, manufacturing or wholesale buildings. The following uses are typical nighttime and/or Sunday uses: auditoriums incidental to a public or parochial school, churches, dance halls, theatres and taverns."

Snohomish County also allows a forty percent reduction of required off-street parking spaces, if "effective alternatives to automobile access are proposed to be implemented."

Parking Requirements: Notable Policies and Projects

In December of 1990, the Association for Commuter Transportation and Seattle METRO sponsored a Symposium on Commuter Parking. At this conference, a presentation by consulting firm K.T. Analytics, Inc. on "Local Zoning Codes and Parking Supply" included a list of "Promising Parking Supply Policies", which recommended that communities:

1. "Set tighter maximum and minimum parking requirements at new developments to ensure overly excessive parking supply is not provided (e.g. Seattle, San Francisco, Miami, Portland)...

2. "Allow reductions in existing minimum requirements, possibly to levels below the demand derived from standard trip generation rate analyses, in return for traffic mitigation (Bellevue, Los Angeles, Chicago, Hartford). In many situations, it may be worthwhile to consider elimination of the minimum requirement altogether... (emphasis added)

3. "Set caps on parking supply within certain zones (Portland, Boston, Cambridge)..."
4. "Require reservation of (setting aside of) a certain percentage of spaces in preferred locations for exclusive use by HOV modes (Portland)...

5. "Require setting aside of certain spaces for short-term parkers (Miami, Portland)...

6. "Set up incentives for developers to provide a lower amount of parking (e.g. in-lieu fees in Calgary, Davis, Orlando).

7. "Allow the local public parking authority to provide substitute parking off-site in return for payments by developers, thus enabling greater administrative, operating and rate setting control by the public authority. In some cases, such management control has led to more rational parking price structures which are conducive to greater HOV use (Montgomery County, MD; Miami)."

K.T. Analytics further concluded that

"(t)he effectiveness of these strategies will depend on local conditions and variables. Localities with the best prospects for realizing reductions in auto use through reduced or flexible parking requirements are those where some or all of the following conditions apply:

1. "Developer and lender preferences/requirements or the minimums set by the parking codes result in more parking than is utilized;

2. "Mixed uses are available or planned where parking spaces can be shared and used jointly by different travelers (e.g., by commuters during weekdays and shoppers and others at other times);

3. "Employer subsidies for parking are not extensive, or will be curtailed or cashed out in the form of travel allowances.

4. "Nearby private, commercial and off- and on-street parking supply is well utilized and enforced (thus limiting opportunities for parkers to simply shift parking locations as supplies are tightened);

5. "The costs of providing parking are high compared to traffic mitigation alternatives; transit capacity is not saturated; uncontrolled parking supplies (e.g., on-street) are at a minimum or new controls are planned" (Association for Commuter Transportation 1990).

Examples of the parking policies described by K. T. Analytics include the following jurisdictions:

Seattle

Seattle establishes a lower minimum number of off-street spaces in downtown zones based on the degree of access to transit. In addition, Seattle allows a maximum of 1 space per 1000 sq. ft. of nonresidential use; greater amounts are allowed only through a special exception. Seattle also allows off-street parking to be waived completely in areas such as the Pioneer Square Historic District.

Bellevue

Bellevue also establishes a maximum number of off-street spaces in Central Business District zones; maximum parking spaces are also specified for some non-CBD land uses. In a July, 1991 American Planning Association (APA) publication, results of a survey of parking regulations for 127 jurisdictions throughout the United States showed that Bellevue was the only jurisdiction listed with maximum limits on non-CBD off-street parking (although it should be noted that the APA survey did not include a complete sample of large cities). While Seattle and many other cities have established maximum requirements for off-street parking within their central business districts, Bellevue's non-CBD parking limits are unusual and perhaps unique.

Portland, OR

With the adoption of the 1975 Downtown Parking and Circulation Policy (DPCP), Portland established a cap on the total number of off-street parking spaces to be allowed in their CBD. The cap was placed at 43,000 spaces; this policy was re-evaluated in 1986, and in 1990 the Downtown Parking Management Plan was adopted which specifies 1,300 additional off-street parking spaces over the old limit of 43,000, and 35% transit ridership by 2000. This Portland example highlights the need for ongoing evaluation and adjustment of parking policies (Association for Commuter Transportation 1990, IV13-IV14).

Cambridge, MA

In the central business district of Cambridge, maximum off-street parking spaces are specified in land use codes. If the maximum is exceeded, there is a reduction or penalty in the allowable floor area ratio (FAR) of a new development. This is an example of a program which links parking policies with density standards to discourage excessive parking and encourage higher employment density.

Scarborough Centre - Toronto

Zoning controls regulating the development of the Scarborough Centre in Toronto limit parking to 0.3 spaces per 1,000 square feet of office space. The relatively low parking maximum is balanced by strong transit service: Scarborough Centre is one of a number of linked centers within the overall Metropolitan Toronto Plan that are supported by direct transit service with downtown Toronto.

Transportation Programs

Transportation Programs and Land Use Policies

Transportation or traffic ordinances and other programs that address land use-transportation issues may be grouped into two general categories: Transportation Demand Management Programs and Concurrency/ Road Adequacy Ordinances.

Transportation Demand Management (TDM)

Transportation Demand Management (TDM) is a concept which includes "(c)ommuter assistance, parking incentives, and work policies that alter the demand for travel in a defined area, in terms of the total volume of traffic, the use of alternative modes of travel, and the distribution of travel over different times of the day" (Dunphy and Lin 1990). TDM programs may involve both land use-related techniques (e.g. parking policy) and non-land use approaches (e.g. employer subsidies).

There are two general types of transportation demand management programs which are often addressed in land use ordinances. They are Transportation Management Associations (TMAs), and Trip Reduction Ordinances (TROs).

Transportation Management Associations (TMAs)

A Transportation Management Association is "(a)n organization that provides a structured environment for developers, property managers, employers, and sometimes public officials to cooperatively promote programs that mitigate traffic congestion, assist commuters, and otherwise encourage travel in a given area. Such organizations also often serve as fulcrums in which the private sector and state and local governments can meet to address jointly current and future road and transit needs" (Dunphy and Lin 1990).

Trip Reduction Ordinances (TROs)

A Trip Reduction Ordinance is a regulation, "passed by a local government requiring developers, property owners, and employers to participate or assist in financing transportation management efforts. In many instances, such ordinances specify a target reduction in the number of vehicle trips expected from a development based on standardized trip generation rates" (Dunphy and Lin 1990).

Although TMAs and TROs are now widely established throughout the U.S., the exact extent of these demand management approaches is not easily assessed. One recent study by the Urban Land Institute (ULI) concluded that there were 13 fully operational, and 24 "startup" TMAs throughout the country as of mid-1990, and that there were "at least" 24 TROs in seven different states: California, Washington, Arizona, Maryland, Connecticut, New Jersey, Virginia, and Minnesota (Dunphy and Lin 1990). Ferguson cites another study by Wright, reporting that as of August 1989 there were "53 TMAs located in 14 different states.....and fully 40%

came into existence in the year 1989 alone." Approximately 40% of those TMAs were in California jurisdictions (Ferguson 1990). In yet another study, a 1990 report by the California Department of Transportation concluded that there is "an upper limit of 59 separate TROs in 46 independent jurisdictions...and 67 percent of all TROs were concentrated in the state of California." The study also identified TROs in county and regional TROs including Maricopa County, AZ, Montgomery County, MD, Sacramento County, CA, and the South Coast Quality Management District, CA (Ferguson 1990). These differing accounts of TMAs and TROs may be explained by the difficulties in acquiring information on a nationwide basis, differing definitions of TMAs and TROs, or the increasing popularity of these programs that results in studies being outdated by the time of publication. In any case, it appears that transportation demand management approaches are becoming increasingly popular; however, their performance is just now being assessed in major studies.

Concurrency/Adequacy Standards

Concurrency/Adequacy standards are ordinances which establish transportation improvement prerequisites to new development. An ordinance of this type will often link the approval of a project to the mitigation of significant transportation impacts that are expected to result from the project. These improvements generally take the form of road network and signalization enhancements; however, TDM programs and increased transit service and access may also be used to mitigate traffic impacts.

Transportation Programs: An Overview of Land Use Policies

Trip Reduction Ordinances and Transportation Management Associations

The TRO in the Seattle Central Business District illustrates some typical ordinance features; for example, all structures containing more than 10,000 sf of nonresidential space are required to develop a transportation management program that includes a transportation coordinator who works with the City of Seattle's Rideshare office to "encourage use of public transit, carpools, vanpools, and flextime". In the Seattle CBD, transit usage is promoted by permitting more than 1 long-term parking space per 1,000 square feet of nonresidential use only by special permission of the Planning Director, and restricting parking in the CBD based on the type of use and whether the occupancy is within areas with "high transit access" or "moderate transit access."

To reduce auto dependency outside of the CBD, Bellevue also instituted a Transportation Management Program that is included in the Zoning Code. This program applies to all new structures within office and residential zones including the OU, R-2.5, R-3.5, R-04, R-5, R-10, R-15, R-20, R-30, PO, O, OLB, LI, GC, NB, and CB districts. Multi-family residential dwellings of less than 16 units and other developments based on square footage are excluded from the program. (Bellevue Land Use Code Section 20.20.595)

Concurrency / Adequacy Ordinances

Bellevue

The Bellevue Transportation Improvement Program implements a city-wide concurrency program. Its stated goal is to "develop and adopt a program for the purpose of jointly funding, from public and private sources, transportation improvements necessitated in whole or in part by development and growth within the plan area...provide a fair and predictable method for allocating the cost of reasonable and necessary transportation improvements between the public and private sectors... create a mechanism to charge and collect transportation impact fees from new development to provide a portion of the funding for reasonable and necessary off-site transportation improvements to mitigate the cumulative impacts of growth and development in the plan area...". This plan measures traffic impacts based upon expected peak hour traffic, and requires developers to pay, or promise to pay, computed fees at the time of permitting.

Spokane County

Spokane County requires the following provision for transit systems: Within the B-2, B-3, I-1, I-2, UR-12, and UR-22 zones, any proposal or development that generates

one thousand (1,000) Average Weekday Trip Ends shall have its owner or representative "negotiate in good faith with the Spokane Transit Authority for the possible provision of facilities that would enhance the provision of public transit" (Spokane County Land Use Code Section 14.626.380-Typ.).

While specific provisions for transit systems and transportation demand management programs have generally been limited to CBDs, this contrast between specific land use controls in CBDs and very loose controls in suburban areas appears to be diminishing, particularly as regional or statewide efforts to implement TDM programs are developed. The state Commute Trip Reduction requirements of HB 1671 would be expected to encourage this trend.

Transportation Programs: Notable Policies

Trip Reduction Ordinances and Transportation Management Associations

As noted earlier, programs such as TROs and TMAs have become increasingly common in recent years. While the popular use of these approaches is a relatively recent phenomenon, their historical antecedents also have a strong record. In 1973 the Tennessee Valley Authority (TVA) initiated a program which included subsidized express buses, subsidized carpool parking spaces, and cash subsidies of $9.50 per month to each vanpooler. The program was evaluated in a study conducted in 1977 by the University of Tennessee; a summary of the study's conclusions was presented by John Meyer and Jose Gomez-Ibanez in Autos, Transit, and Cities:

> Between late 1973 and early 1977, the number of commuters' automobiles arriving at TVA (including private cars, carpools, and vanpools) declined by more than one half (from 2,195 to 1,066), despite a 15 percent increase in employment (from 2,950 to 3,400). This achievement is all the more remarkable because almost 12 percent of the TVA vanpoolers previously commuted by bus, and almost 37 percent previously commuted by carpool. The annual benefits to TVA of the pooling and express bus incentive programs in savings on parking spaces alone has been estimated to be $337,820 per year against a direct cost to TVA of $125,000 per year. (Meyer and Gomez-Ibanez 1981, 82)

In nationwide studies, the Bellevue Transportation Management Association (TMA) has been widely publicized as a successful employer-based program. In a 1990 DOT study, major Bellevue employers U.S. West and CH_2M Hill were cited for instituting successful trip reduction measures. For example, among its 1,150 employees, U.S. West attained a 47.6% reduction in vehicle trips, while CH2M Hill attained a 31.2% reduction in vehicle trips among its 400 employees. Downtown Bellevue has attained an overall reduction in vehicle trips of 17.8% (Dunphy and Lin 1990).

House Bill 1671 was adopted during the 1991 legislative session, and requires that all counties with a population greater than 150,000 institute and administer Transportation Demand Management Programs which will require all employers with more than 100 employees to organize programs to reduce the use of single occupancy vehicles. The required reductions will be staged over time, with an eventual reduction in SOV trips of 35% by 1999.

Statewide or regional transportation demand legislation is not unique to Washington. For example, Arizona's 1988 Air Quality Bill requires large employers (those with more than 100 employees), to institute travel reduction programs (Dunphy and Lin 1990). Santa Clara (CA) County and five California cities in the Silicon Valley region organized what has been described as the "first multijurisdictional TDM ordinance" in January of 1991. This ordinance is entitled the "Golden Triangle Transportation Management Program" and is summarized as follows:

> The TDM ordinance applies a time schedule for program implementation to four categories of employers at six-month intervals. Those employing 100 to 249 employees will be the last required to

develop programs. Employers must designate a transportation manager to oversee program operation, compile and submit baseline and annual TDM reports, and serve as a liaison with the city. A baseline report includes the number of employees by work hours and site, a residence zip code breakdown of employees, and the average vehicle ridership (AVR), or total number of employees divided by the number of vehicles they drive from home to work. The ordinance describes methods for determining AVR and notes that AVR credit may be given for employee work trips eliminated due to compressed work weeks or telecommuting. The AVR is based on the morning peak period. The manager also reports on the information, incentives, and ridesharing programs offered. Though there are penalties for not meeting these reporting requirements, the ordinance does not penalize employers for failing to meet participation-rate goals. (Zoning News, pg. 3 April, 1991)

Concurrency/Adequacy Ordinances

A common feature of concurrency and adequacy ordinances is the requirement that the proposed development pays for transportation system improvements if the traffic generated by the development is expected to exceed given levels, usually expressed as a certain "Level of Service" (LOS); common traffic LOS standards range from A to F, where A corresponds to free-flowing traffic and unimpeded movement, and F corresponds to stop-and-go, highly congested traffic. These types of ordinances are usually called "Concurrency" or "Adequate Facilities" ordinances because the improvement of transportation facilities to an adequate service level must be concurrent with project development. These ordinances often focus on road system improvements, but they may also include the concurrent development of other infrastructure features including sewers and lighting, as well as TDM or TMA measures.

The following are three notable examples of concurrency ordinances, two of which are in Washington State:

Montgomery County, Maryland
In 1973, Montgomery County, Maryland was one of the first jurisdictions to pass an adequate public facilities ordinance (APFO). Within Maryland County, the large employment center of Silver Spring is regulated by a TDM program which requires developers to negotiate 10-year TDM programs or contribute to transportation system improvements specified by the APFO. Existing and new employers in Silver Spring are required to achieve an average occupancy of at least 1.3 persons per vehicle with 30 percent transit ridership. In addition, the county will also subsidize transit passes for employees, allowing use of the Metro system that serves Silver Spring. This is one example of a way in which TDM and concurrency programs may be combined to form a hybrid transportation management program.

King County, WA
The King County zoning code includes a type of concurrency ordinance known as "Road Adequacy Standards". Its purpose is described as follows:

> The purpose of road adequacy standards is to ensure adequate levels-of-service on roadways and intersections. Road adequacy standards shall be used to evaluate the impact of proposed developments' traffic on roadways and intersections, to apply conditions assuring that road capacity will be adequate, and to deny proposed developments which would have unacceptable impacts on road safety or levels-of-service.(Sec. 21.49.020)

"Proposed developments" are defined as

> A subdivision, short subdivision, planned unit development, master plan development, a conditional use permit, or an unclassified use permit or any development proposal requiring a building permit exclusive of any use which is categorically exempt under the State Environmental Policy Act as implemented by King County. The renewal of permits or the issuance of a new permit for existing uses constitutes proposed development only if it will generate additional traffic above that

currently generated by the use. (Sec. 21.49.010)

The specific concurrency provisions of the ordinance are described as follows (Section 21.49.050):

A proposed development which will have a direct traffic impact on a roadway or intersection with a calculated LOS F shall not be approved unless:

1. The applicant agrees to fund improvements needed to attain LOS D or better, unless the calculated non-project LOS is E or F, in which case LOS E must be attained; or
2. The applicant reduces his traffic impacts to achieve a level-of-service E by scaling his project down or by using Transportation System Management techniques to reduce the number of peak hour trips generated by the project, or
3. For subdivisions and planned unit developments only, King County establishes a date for final approval to become effective which corresponds to the anticipated date of award of a construction contract for county, city, or state improvements needed to provide LOS D or better, unless the calculated non-project LOS is E or F, then LOS E must be attained; provided such effective approval date may be established when the anticipated date of award of construction contract is within twelve months; or
4. The roadway or intersection has already been improved to its ultimate roadway section and the applicant agrees to use TSM incentives and/or phase the proposed development as determined by King County.

Snohomish County

Snohomish County has implemented a very detailed concurrency ordinance entitled "Title 26B: Developer Contributions for Road Purposes as a Condition of Land Use Approvals." The purpose of Title 26B (also known as the "Roads Ordinance") is stated as follows:

The purpose of this title is to ensure that public health, safety and welfare will be preserved by having adequate roads serving new and existing developments by requiring all development, as defined in SCC 26B.51.040, in unincorporated Snohomish county to mitigate traffic impacts which may include contributing a proportionate share of the cost of road improvements reasonably necessary as a result of the direct traffic impact of the proposed developments. (Snohomish County Code 26B.50.020)

A "Development" is defined by Snohomish County as follows:

Development means all subdivisions, short subdivisions, industrial or commercial building permits, conditional or special use permits, or building permits (including building permits for multi-family and duplex residential structures) and all similar uses in unincorporated Snohomish county, and other similar projects requiring land use permits or approvals by Snohomish county, except single-family residential building permits on existing tax lots. (Snohomish County Code 26B.51.040)

Title 26B requires that a proposed development be studied for its development mitigation obligations, road system capacity requirements, and level-of-service requirements, which are defined as follows:

Development mitigation obligations

"Any application for approval of a permit for a development shall be reviewed to determine, for the following, reasonable mitigation obligations for direct impact:

1. "Mitigation of impact on road system capacity"
2. "Mitigation of impact on specific level-of-service D, E, & F locations"
3. "Mitigation of impact on specific inadequate road condition locations"
4. "Construction of frontage improvements"
5. "Dedication or deeding of right-of way"

Road system capacity requirements
"The direct traffic impact of any development on the capacity of all arterials and non-arterials in the road system identified as needing future capacity improvements in the currently adopted road needs report will be mitigated either by constructing road improvements which offset the traffic impact of the development of by paying the development's share of the cost of the future capacity improvements."

Level-of service requirements
"Mitigation of impacts on level-of-service D, E, or F conditions is required. If such conditions are found to be existing in the development's road system at the time of development application review, and the development will put three or more peak hour trips through the identified locations, at the time of full occupancy of the development, the development will only be approved if provisions are made in accordance with chapter 26B55 of this title for improving the level-of-service deficiencies."

Under Title 26B, Snohomish County has also established specific requirements when a development's road system includes a state highway:

1. "Mitigation requirements for impacts on state highways and at intersections of county roads with state highways will be established by the Washington state department of transportation (WSDOT) rather than by the provisions of chapter 26B.52 SCC and SCC 26B.55.010 through 26B.55.060. The requirements will be imposed by the county as a condition of approval of the development."

2. "The director will submit to the WSDOT the traffic study and any other information relating to the direct traffic impact of the development, and request a review under the WSDOT's mitigation policy."

3. "The director will submit the WSDOT determined mitigation measures to the approving authority and the approving authority will impose such mitigation measures as a condition of approval of the development. A tri-party agreement between the developer, the county, and WSDOT addressing the mitigation measures must be executed prior to the issuance of a building permit or the recordation of a subdivision, or short subdivision, whichever is appropriate."

4. "A development which takes access solely from a state highway will be required to meet WSDOT requirements for additional right-of-way and frontage improvements, traffic control at the site entrance, and mitigation of offsite direct traffic impacts on the state highway as deemed necessary by the WSDOT. Such developments must also comply with this title with respect to county roads in its road system."

Title 26B also includes a specific reference to project impacts on transit usage by mentioning the Snohomish Transportation (Sno-Tran) Authority handbook on land use-public transportation linkages, and noting that "public works and community development staff will ensure that the principles and goals of the Sno-Tran A Guide to Land Use and Public Transportation are followed in onsite design so as to make new developments as compatible with transit service as possible."

Mixed Use Developments

Mixed Use Developments and Land Use Policies

The mixed use development has become a common theme in urban planning policy, research, and scholarly literature. While the concept is not easily defined, this report will define a mixed use development (MXD) to include any building or complex of buildings conceived as a single, united development, which includes two or more distinct uses, such as housing and retail, housing and offices, or retail and offices.

Historically, mixed use developments were common in U.S. cities, especially cities of moderate scale which often included large buildings with retail or offices on the street level, and apartments in the upper floors. Due to an escalation of land prices, increased demand for office space in large cities, and the suburbanization of residential development, housing has generally become scarce in the central districts of typical U.S. cities. To combat these powerful economic and historical forces, many cities are now offering incentives to include housing in CBDs. The increased development of mixed use developments was documented in a 1986 report by the Urban Land Institute which noted that of the 131 mixed use projects that they studied, 61% were developed since 1980.

Mixed Use Developments and Transportation

The now-commonplace large single-family dwelling neighborhood with no nearby retail or other services is a prime example of a development pattern which encourages multiple daily trips by automobile to work, school, shopping centers, service and medical offices. Several studies have documented the importance of a mix of uses or services in city and county residential areas as a design and planning strategy to increase bicycling or walking and reduce automobile dependency. Conversely, suburban office parks and downtown areas that offer a mix of adjacent housing and retail developments can encourage people to use transit and/or walk and bicycle between the various places that they need to visit during a typical day.

In his study of the relationship between suburban activity centers and transportation, Cervero studied the effects of mixed use developments on transit and carpooling compared to developments consisting purely of a single employment use. Cervero concluded that mixed use developments help to reduce dependence on single occupancy vehicles and improve transportation system performance in at least four ways:

1. If services (e.g. retail, banks, social services, etc.) are available at or near the workplace, workers will be more willing to carpool and take transit to work since cars will not be needed for mid-day errands.
2. If housing is included in or near an employment center, it provides workers with the option to live nearby and walk or bike to jobs.

3. The number of required off-street spaces can be reduced if different adjacent land uses have distinct and complementary periods of peak utilization.
4. With different uses and varying peak hours, auto trips will also be spread over a longer period, and typical peak hour congestion is lessened.

While mixed-use developments may consist of any mixture of uses (retail and office, retail and housing, etc.) the inclusion of housing within central business districts is of particular importance. Compared to other major U.S. cities, Boston is noteworthy in the significant residential density of its central city:

> Residential density in the central city does correlate strongly with all the transport patterns, including walking/bicycling. The case of Boston highlights this as it is the highest U.S. city for bicycling/walking to work (10%) and it has 72,000 central city residents, the highest population to jobs ratio (0.33) for U.S. CBDs, thus it is more like a European city in this regard. It is not hard to see that city centres with plenty of employment activity that also have high residential densities (e.g. Paris 235/hectare) would have a significantly higher proportion of people walking and having little need for a car.... (Newman and Kenworthy 1989, 47)

In a recent study of commuting patterns to the Central Area Toronto, University of Toronto professors David Nowlan and Greg Stewart concluded that the inclusion of housing into the mix of uses in a downtown area has a significant impact upon trip generation:

> In Toronto in recent years, commuting trips to the Central Area have not risen as rapidly as would be expected from the growth in downtown office space. Various explanations have been suggested...the rising residential population in the Central Area has served to reduce inbound commuting trips below what they otherwise would be....we have been able to estimate that on average since 1976, for each 100 additional dwelling units in the Central Area there has been a reduction of approximately 120 inbound trips during the morning three-hour rush period. This finding indicates the potential for the use of housing policy as a land-use planning instrument, one that could help mediate the conflict between continued commercial office growth downtown and the desire to preserve the quality of the downtown residential environment.... (Nowlan and Stewart 1991, 165 emphasis added)

Mixed Use Developments: An Overview of Land Use Policies

Within the fourteen jurisdictions surveyed, 25 zoning categories specifically allow and/or encourage mixed-use developments. A mixed-use development could include two different activities in the same building, or two different activities in separate buildings that are in close proximity to each other. That specific types of uses are being specified in particular zones is not as important as the overall trend toward inclusion of mixed use developments throughout planning and land use policies. This trend, however, generally does not include retail or other services in single family residential zones. Similarly, retail and services are often limited in industrial and manufacturing zones.

The following are examples of common mixed-use development references in Washington zoning codes, accompanied by a representative description of a mixed-use zone from the zoning code:

Clark County

The following example from Clark County illustrates a zone that mixes housing and office employment. This zone also emphasizes the quality of design and site design, both pedestrian and vehicular, and permits uses based on conditional use permits and review of the planning director (the design considerations are discussed in greater detail in the section on Site Design):

> Apartment Office Zones (AO-15, AO-18, AO-22, AO-30, AO-43): "These districts are

intended to provide for multiple-family residential and professional office development based upon consistency with the Comprehensive Plan and compatibility with surrounding land uses. It is intended that office developments within these districts will be of a higher standard in recognition of their residential setting. The following factors will be considered in the application of one of these districts to a particular site: proximity to major streets and the available capacity of these streets, availability of public water and sewer, vehicular and pedestrian traffic circulation in the area, proximity to public open space and recreation opportunities. Development within these districts will be reviewed to ensure compatibility with adjacent uses, including such considerations as privacy, noise, lighting and design." Within AO zones (districts), duplex and other multiple dwellings are permitted, and single family dwellings are permitted upon review and approval of the planning director. Home occupations are also permitted in all AO zones with the review and approval of the planning director.Business and professional offices, and medical and dental clinics are permitted in all AO zones. The only retail uses permitted are "restaurants within residential or office complexes" - these are permitted in the AO-43 and AO-30 districts, and they are permitted in the AO-15, AO-18, and A)-22 districts based on a "conditional use permit."

King and Kitsap Counties

The following three zones in Kitsap and King Counties are indicative of mixed use zones which allow a mixture of residential and small-scale retail and service establishments:

King County: Mixed Business-Residential, Neighborhood Scale (BR-N)
This zone "(p)rovides for the location of mixed commercial (i.e. retail and office) and residential use projects, for increased diversity in opportunities for desirable housing, and increased vitality of neighborhood business areas." Multiple dwelling units, accessory residential uses, and retirement homes are permitted residential uses, while retail food sales, business, professional, and personal service offices are permitted commercial uses.

King County: Mixed Business-Residential, Community Scale (BR-C)
This zone "(p)rovides for the location of mixed commercial (i.e. retail and office) and residential use projects, for increased diversity in opportunities for desirable housing, and increased vitality of community business areas." Multiple dwelling units, accessory residential uses, retirement homes, and day nurseries are permitted residential uses. In addition to the commercial uses permitted in the BR-N zone, entertainment and recreation enterprises excluding gambling and adult theaters, and public office buildings, art galleries, museums and libraries are permitted commercial uses in this zone.

Kitsap County: Business Convenience (BN)
Although this zone is not explicitly described as allowing mixed use developments, it is similar to the BR-N zone in King County. "The intent of the business convenience zone is to provide commercial and professional services in neighborhood settings for the convenience needs of the nearby residents rather than the larger community." Single family dwellings, duplexes, multi-family dwellings, and mobile homes are permitted residential uses, while retail, personal and professional establishments intended to serve the needs of surrounding communities and the travelling public are permitted commercial uses.

Bellevue

Bellevue: Central Business District, Multiple Use (CBD-MU)
"The purpose of the CBD-MU district is to provide an area for a wide variety of retail activity, low intensity offices, CBD support services, and residential uses. Multiple uses are encouraged on individual sites, and in individual

buildings, as well as broadly in the district as a whole." The development of residential development is encouraged in the Bellevue CBD-MU and other CBD zones by allowing large increases in the allowable FAR if residential units are included.

Bellevue: Central Business District-Residential (CBD-R)
"The purpose of the CBD-R Land Use district is to provide an area for the City's most intensive urban residential uses. Limited office and retail uses are permitted secondary to residential use, in order to provide the amenity of shopping and services within easy walking distance of residential structures."

Everett

The Everett Zoning Code allows mixed use developments in certain zones, with specific requirements for the relative floor areas of the various uses. Residential uses are permitted in the B-1 Neighborhood Business and B-2 Community Shopping zones only as an accessory to another permitted use. Multi-family dwellings are permitted in the B-2(B) zone only as a part of a mixed use development in which at least 25% of the gross floor area is a permitted use. Multi-family dwellings are also permitted in the B-3 Central Business and W-C Waterfront Commercial zones. One of the stated purposes of the B-3 Central Business zone is to "Provide a multi-use character of retail, service, financial, office, governmental, residential, human service, and cultural activities."

To allow offices and especially medical offices and clinics within multi-family zones, Everett includes three mixed use zones which are treated as overlay zones - these zones overlay the residential zone and allow office and clinic uses where they have already been established. One of these overlay zones is the C Clinic and Medical Related Activities Overlay Zone:

> The purpose of the clinic and medical related activities overlay zone is to provide the opportunity for intensive use of R-3, R-4, and R-5 zoned areas for medical services in areas where such uses are provided by the Everett General Plan.

Renton

The Business District (B-1) in Renton allows the typical office, governmental, and retail uses which are common to a central business district. Residential dwelling units are permitted in the B1 zone, "when located in a mixed use building of commercial and residential uses. No residential uses are allowed on the first floor", (Sec. 4-31-10, emphasis added).

Seattle

The Multiple Residence Mixed Density (RM-MD) zone "provides for variable density housing including tower apartment houses where such buildings have a desirable relationship with surrounding structures, and certain nonresidential uses compatible with housing and with adjacent commercial areas, located in close proximity to the City center or other major subcenters and employment areas, and having access to adequate transportation facilities and other amenity features."

Spokane

The Residence-Office zone (RO) in Spokane is an example of a zone which is further defined by an "RO-I" zone to enable a "fine tuning" of allowable uses:

> The RO zone is intended to accommodate relatively unobtrusive business and institutional uses of a type and in locations where they blend into medium-density or high-density residential areas. There are two categories within the RO zone classification: Category I designated as RO-I, being for the less intensive business uses and Category II, designated RO, being less restrictive." Within the RO-1 zone, multi-family dwellings up to four units are allowed outright, and multifamily dwellings meeting the requirements of the Multi-family Residence Zone (R4) are permitted if, "the longest boundary of the RO-1 zone adjoins an R4, B2, B3, C, or M zone ." Banks, churches, professional offices, hospitals, and post offices are some of the commercial and institutional uses allowed in the RO-I zone. The RO zone in Spokane

permits all uses allowed in the RO-I zone, plus hotels, motels, private clubs and lodges, and restaurants.

Tacoma

The MC "Mixed Commercial District" in Tacoma is an example of a zone which allows a variety of land uses, but it also has been established in response to a specific need to revitalize historic areas surrounding the Central Business District:

> The intent of the mixed commercial district is to govern the use and development of property surrounding downtown Tacoma by providing an appropriate and congruous transition between the high intensity Central Business District and its surrounding areas. Much of the area surrounding the Tacoma CBD has been developed for many years, making it difficult to rehabilitate and reuse the existing buildings.....The establishment of a Mixed Commercial District promotes physical and economic revitalization, encourages greater occupancy and increased use of land and existing buildings, and achieves a greater variety of urban functions including light manufacturing, commercial service, wholesale, retail and other uses compatible with downtown Tacoma.

Although Seattle, Bellevue, and Spokane are instituting bonuses to encourage housing in their Central Business Districts, other smaller cities and counties are generally not providing incentives to include housing within other zones or developments. Housing is often allowed in many zones; however, if the zone also allows a more intensive (i.e. more profitable) use than housing (e.g. office or retail), there is very little financial incentive to include housing within a development.

While the concept and benefits of mixed-use developments are now well understood and widely publicized, and many cities and counties have established zones which allow a wide variety of land use activities, there are few incentives (outside of CBDs) to encourage mixed-use complexes. In the absence of strong leveraging techniques, market forces and economic considerations tend to force the development of land toward the most intensive single use allowed.

Mixed Use Developments: Notable Policies and Projects

The inclusion of housing units in areas with retail and/or office occupancies is a common type of mixed use development that is allowed and often encouraged in CBD zoning codes. Many jurisdictions are providing substantial development bonuses if housing is provided within central business districts. Spokane's proposed zoning code considers residential uses as "free floors" in the calculation of an allowable FAR; that is, the floors used as residential housing are not counted toward the developer's allowable density limit (the existing code allows the same FAR without the bonus for residential development). Seattle counts housing as a "public benefit feature", and within the CBD the inclusion of housing results in an increase in allowable floor area for the overall development. Similarly, Bellevue allows increases in allowable floor area ratios if housing is included in new developments within the CBD. Tacoma requires three "public benefit features" for new developments within their CBD; housing is one possible choice, although a developer could include art work, street trees, awnings, or one similar feature to meet Tacoma's requirement (Tacoma Land Use Regulatory Code 13.06.310D).

The following examples of mixed use developments illustrate the diversity of design and scope in such projects:

> The Uptown development (San Diego) emphasizes housing within a typical shopping center type of development (see figure 4). The site features a conventional shopping center adjacent to a mixed use transition area of residential and retail activity, and a residential area. These three elements are united by a central pedestrian spine.

> RiverPlace (Portland) is a smaller scale mixed use project on the Portland

waterfront (see figure 5). In contrast to the Uptwon development which has horizontally distributed land uses, RiverPlace features residential units stacked on top of street-level commercial and office development, with nearby recreational activities.

The Newmark (Seattle) is a downtown residential tower atop a three-story retail complex featuring services, retail businesses, and a theater. The retail interior will feature a drugstore as a primary tenant. The vertically stacked uses in this tower combine with a commercially active location (Pike Place) and proximity to adjacent retail, financial and convention facilities to reinforce its mixed use intent.

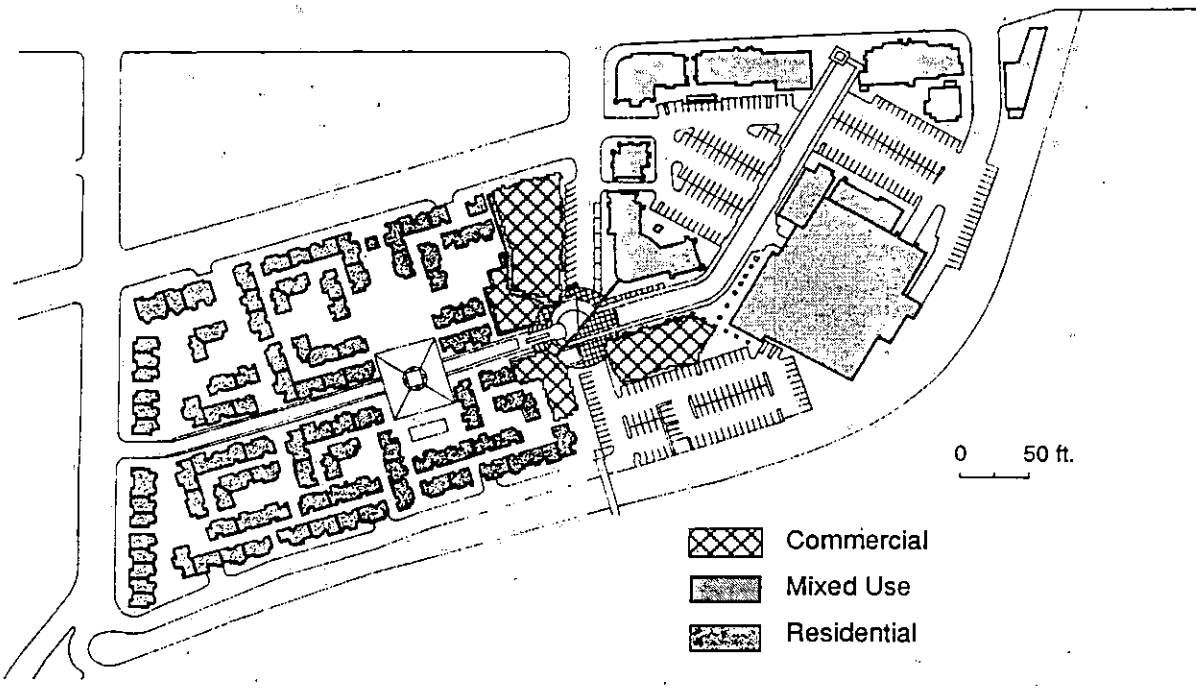


FIGURE 4. Uptown Site Plan

FIGURE 5. RiverPlace (Portland) Mixed Use
(Source: Portland Central City Plan)

Site Design

Site Design and Land Use Policies

For the purposes of this study, the general term "site design" includes setbacks and site development (including provisions for pedestrians and bicycles), street systems (emphasizing subdivision design), and street level design (emphasizing requirements for street level retail and other amenities in central business districts). Site development and street system elements are generally not established in a single "site design" ordinance, but rather through a combination of setback requirements, subdivision regulations, road design standards, and other sections of zoning and municipal codes. Street level design elements are also becoming an integral aspect of typical codes in larger cities.

Site Design and Transportation

In general, attempts to link aspects of site design and transportation are fairly recent, although this type of research is gaining strength and popularity. Three recent books written and edited by University of Washington professors are prominent works in this field: Public Streets for Public Use (1987, edited by Anne Vernez Moudon) is a comprehensive review of the historical evolution of streets from small-scale mixed-use open spaces, to the large, open traffic ways represented by the typical street grid in U.S. cities. Public Streets also includes case studies of current efforts to humanize the scale of street systems. Accommodating the Pedestrian (1984, written by Rich Untermann) was the first comprehensive effort to advocate the importance of pedestrian and bicycle networks in cities. Untermann cites several good and bad examples of designs that do or do not "accommodate" the pedestrian. The Pedestrian Pocket Book: A New Suburban Design Strategy (1989, edited by Doug Kelbaugh) describes the so-called pedestrian pocket approach to community planning and design. Kelbaugh, architect Peter Calthorpe, and others advocate a return to compact communities with more traditional (grid-like) street systems and transit links to central cities. The pedestrian pocket approach is discussed further in the section Master-Planned Developments. The following overview describes in more detail the link between specific aspects of site design and transportation.

Setbacks/Site Development

The relationship between site development and increased pedestrian or public transportation use is based upon the presumption that a well-designed development circulation system will not only encourage pedestrian use, but improve access to (and therefore the attractiveness of) public transportation as well.

In the area of pedestrian incentives, considerable research which relates street design and pedestrian comfort (and therefore, incentives to increased pedestrian use) has been carried out by landscape architect and University of Washington professor Rich Untermann. As an example, in Public Streets for Public Use Untermann analyzed the

relationship between automobile speeds on a street and pedestrian comfort on adjacent sidewalks. Untermann evaluated vehicle speeds and various types of buffers between the street and the sidewalk, and concluded that vehicle speeds in excess of 20 mph will cause discomfort to pedestrians on the sidewalk if a buffer is not incorporated between the sidewalk and street.

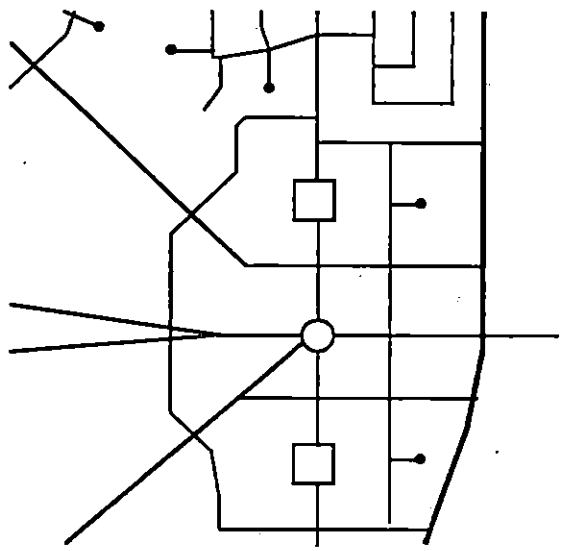
In the area of pedestrian access to transit, exact relationships between pedestrian systems and public transportation are not easily quantified; however, an analysis of walking distances to transit stops was conducted in the late 1970s by the Tri-Met Authority in Portland. Their analysis indicates that people are more willing to walk to transit stops if the pedestrian way is direct, well-designed, and convenient to use. Large setbacks from the street to building entries are generally considered to be an impediment to transit to the extent that they inhibit speedy access to transit stops that are generally at the street. These large setbacks are sometimes defined by ordinance; as we will see later, however, they often result from the developer's desire (or a parking ordinance requirement) to provide large expanses of parking in front of buildings.

Street Systems

In recent planning practice, a "traditional neighborhood" movement is beginning to influence the design of street systems in typical subdivisions. Proponents of the traditional neighborhood movement advocate a return to more traditional, grid-like streets and blocks. In contrast to the typical subdivision street system which features curvilinear streets and cul-de-sacs, the "traditional" approach to street system design has been proposed as a more efficient design strategy. Research to quantify the differences between these design strategies is still in its infancy, and in any case, street system designs are site-specific to the extent that they must be appropriate to the terrain, existing landscape, natural features, and other conditions.

Nevertheless, the debate over the influence of neighborhood-level site design on transportation has been increasingly described in terms of this contrast between conventional

Conventional Neighborhood



(Neo)Traditional Neighborhood

FIGURE 6. Conventional Neighborhood Development (CND) vs. (Neo)Traditional Neighborhood Development (TND)

street design (CSD) characterized by multiple curving streets and dead-end cul-de-sacs, and a traditional neighborhood development (TND) with a rectilinear grid pattern of streets (see figure 6). A recent comparison of traffic

capacities and flows of a conventional street design with traffic characteristics of a more traditional street pattern claimed that:

1. The traditional neighborhood development (TND) has superior traffic capacity.

2. The traditional neighborhood development (TND) has lower travel speeds but comparable travel time: the lower speeds are due to the larger number of intersections, but "due to the geometry of a dense network of streets, (the TND) reduces the travel distance for any given pair of origins and destinations..."

3. The "quality" of the automobile trip is higher in the TND, where trip quality is illustrated with the following hypothetical comparison of a trip through a CSD with one through a TND:

   "In the conventional subdivision layout example, the trip begins at home and first travels on a local street, then proceeds to a collector street, and from there to a typical arterial street....The first part of the trip..is a pleasant, high-quality experience. However, after this initial segment of high quality, things begin to deteriorate. The next part of the trip, on the collector, is a boring, low-interest experience, due to the deliberate removal of all interaction from the roadside... Things go from mediocre to bad on the arterial street. The introduction to the arterial street is a 70-to-90-second wait at a traffic signal, with nothing else to occupy the driver's attention. once on the arterial, the driver is exposed to an expanse of pavement (parking lots) and a lack of people...

   "The quality profile of a trip made on a TND network is radically different from the same trip made under conventional street design (CSD). The TND trip sustains a high quality of travel throughout the entire trip, because it is made entirely on local, collector, and small arterial streets. Instead of a continuously deteriorating quality of travel, the TND trip maintained a consistent high-quality profile..."

4. The TND is friendly to non-motorized travel:

   "Since one of the principal motivations behind the TND approach to design is to create pedestrian environments, it should not be surprising to learn that the TND performs well as a pedestrian environment. Perhaps the largest underlying factor in the pedestrian-friendliness of the TND approach is the concept that land uses are interwoven in an intimate mix. This is something that, despite all efforts, we are simply not achieving in our so-called mixed-use developments... TND, because of its intimate mix of activities and density of network, provides a shorter travel distance for pedestrian trips. In most cases this is due simply to geometry. A dense network simply provides a shorter travel distance between two points....A series of small streets yields a better bicycle and pedestrian environment than a hierarchy of a few larger streets..." (Kulash 1990, 107-114)

Site design elements also have the potential to influence an urban environment far beyond the transportation movement patterns associated with a single building or development. The broad definition of site design that is used in this study includes elements that have potentially widespread influence on transportation mode choice when incorporated into city-wide requirements. As an example, consider the potential influence of a single design element, city block size, on the overall character of a city. Typical city block sizes have increased in size throughout history, from the small blocks of the pedestrian-oriented "walking city" of the past to the much larger blocks and subdivisions of contemporary, vehicle-oriented cities. In a recent review of its architecture and city planning efforts, it was noted that Portland's 200-foot square city blocks give the city an "intimate, human scale" (King 1991, 14). In

contrast, Bellevue's 600-foot square "superblocks" have been highly publicized but in a more critical vein:

> Around the time of incorporation in 1954, its (Bellevue's) planners sternly scored the city into 600-foot superblocks wrapped by six-plus lanes of arterial roads. It won a prize, says local planning consultant Don Miles, for providing ample parking deep into the future....'It was the kind of place where you'd drive everywhere - no sidewalks, no landscaping', says Robert Derrick, former assistant planning director...
>
> Change came in the late 1970s, when Bellevue, like other towns in this self conscious state, looked at the despoliation of the suburbs and the countryside that was happening elsewhere....The result was a surge of citizen activism. In 1979, a downtown plan was adopted, setting policies for land use, transportation and design. The plan was followed in 1981 by the regulations that would transform it into action. Parking ratios were cut in half. Setbacks were eliminated. Height limits were set. And incentives for open space, ground floor retail, and public amenities were outlined. Two years later, design review to add still more specificity was installed. (Kay 1991, 6)

As a part of the overall design strategy for their CBD, Bellevue now encourages mid-block pedestrian connections that allow people to walk through the middle of the large block patterns in the dowtown Bellevue area.

Street Level Design

Street level design and transportation are closely related, particularly when an attractive pedestrian environment at the street level encourages people to walk rather than relying on their cars for short trips. The growing realization of the importance of dense, continuous pedestrian activity has led to zoning codes which now require and/or encourage street level retail uses and other amenities in CBDs.

In addition to basic street level elements like good sidewalk systems with adequate connections between developments, which are certainly necessary for comfortable, efficient pedestrian use, the "pedestrian-friendliness" of a street level environment is also influenced by the continuity, intensity, and interest of street-level activities, features, and amenities. The perceived attractiveness to pedestrians is also enhanced by the presence of the pedestrians themselves; recent research by Anne Vernez Moudon and Rich Untermann suggests that, "at least 380 pedestrians per hour (on both sides of the street) yields a healthy, solid pedestrian environment" (Untermann and Moudon 1990, 8).

Site Design: An Overview of Land Use Policies

Setbacks and Site Development

Within the 14 study jurisdictions, the setback requirements were analyzed for 87 zones. Front setbacks were tabulated for all zones that allow commercial, office, and/or industrial activities.

The front setbacks are usually expressed as minimums, although some cities (Bellevue, Seattle, and Everett) will not allow a setback along certain streets in their Central Business Districts; these setbacks are listed as maximums. None of the jurisdictions specify maximum setbacks in commercial, suburban office or manufacturing-industrial zones. Tables 10 and 11 illustrate the range of setback values.

Large front setbacks from the street are typical of shopping center, suburban office park, and manufacturing/industrial developments. However, the numbers tabulated in Tables 10 and 11 indicate that the zoning codes are not requiring these large setbacks; rather, setbacks are being established to accommodate large expanses of highly visible, highly accessible parking in front of retail, office, and manufacturing buildings. With the exception of CBDs, typical zoning codes are not requiring or encouraging any provisions to allow direct pedestrian access from sidewalks and street systems to building entries. In fact, outside of the code requirements for Central Business Districts, there is a general lack of design standards that

encourage or require any public amenities in new developments.

Subdivisions

The control of the subdivision of land varies in every state. For the purposes of this study, the legal statutes of two states, Washington and California, will be outlined to provide an overview of the relative roles of states and cities in the process of controlling the subdivision of lands.

A subdivision is legally defined by the State of Washington as

> ...the division or redivision of land into five or more lots, tracts, parcels, sites or divisions for the purpose of sale, lease, or transfer of ownership, except as provided in subsection (6) of this section. (RCW A 58.17.020)

The aforementioned "subsection (6)" includes this definition of a short subdivision:

> "Short subdivision" is the division or redivision of land into four or fewer lots, tracts, parcels, sites or divisions for the purpose of sale, lease or transfer of ownership: *Provided,* That the legislative authority of any city or town may by local ordinance increase the number of lots, tracts or parcels to be regulated as short subdivisions to a maximum of nine..." (RCW A 58.17.020).

The state's role in controlling the subdivision of land throughout the state is described as follows:

> The legislature finds that the process by which land is divided is a matter of state concern and should be administered in a uniform manner by cities, towns and counties throughout the state. The purpose of this chapter is to regulate the subdivision of land and to promote the public health, safety and general welfare in accordance with standards established by the state to prevent the overcrowding of land; to lessen congestion in the streets and highways; to promote effective use of land; to promote safe and convenient travel by the public on streets and highways; to provide for adequate light and air; to facilitate adequate provision for water, sewerage, parks and recreation areas, sites for schools and school grounds and other public requirements; to provide for proper ingress and egress; to provide for the expeditious review and approval of proposed subdivisions which conform to zoning standards and local plans and policies; to adequately provide for the housing and commercial needs of the citizens of the state; and to require uniform monumenting of land subdivisions and conveyance by accurate legal description." (RCWA 58.17.010)

The state does, however, grant substantial authority and responsibilities to cities, towns, and counties. The following citations define two general responsibilities of individual jurisdictions:

> If a city, town or county has established a planning commission or planning agency in accordance with state law or local charter, such commission or agency shall review all preliminary plats and make recommendations thereon to the city, town or county legislative body to assure conformance of the proposed subdivision to the general purposes of the comprehensive plan and to planning standards and specifications as adopted by the city, town or county. Reports of the planning commission or agency shall be advisory only...(RCWA 58.17.100

> The city, town, or county legislative body shall inquire into the public use and interest proposed to be served by the establishment of the subdivision and dedication. It shall determine if appropriate provisions are made for, but not limited to, the public health, safety, and general welfare, for open spaces, drainage ways, streets, alleys, or other public ways, water supplies, sanitary wastes, parks, playgrounds, sites for schools and schoolgrounds, and shall consider all other relevant facts, including sidewalks and other planning features that assure safe walking conditions for students who walk to and from school, and determine whether the public interest

TABLE 10. Highest Values of Setbacks for Select Zones

Zones	Cities	Counties
Neighborhood and Community Commercial/Retail	30'	40'
Regional Commercial/Retail	25'	35'
Downtown CBD zones	0'	NA*
Light Industrial	20'	50'
Heavy Industrial	20'	35'
Office Park and Industrial Park	60'	100'/50'**

TABLE 11. Lowest Values of Setbacks for Select Zones

Zones	Cities	Counties
Neighborhood and Community Commercial/Retail	0'	8'/25'*
Regional Commercial/Retail	0'	8'/25'*
Downtown CBD zones	0'	NA*
Light Industrial	0'	8'/25'*
Heavy Industrial	0'	20'
Office Park and Industrial Park	25'	30'

*Note: NA = Not Applicable: County Codes do not include CBD zoning designations (typical zoning practice)
**Note: dependent on type of street

will be served by the subdivision and dedication... (RCW A 58.17.110)

More specific provisions concerning subdivisions are specified in the individual subdivision regulations of each jurisdiction. For example, King County includes the following requirements within Title 19 (Subdivision provisions) of the King County Code:

Dimensions of lots: "The minimum dimensions for lots shall conform to the dimensions established in the zoning code and shall not be less than the requirements for the use district in which located." (19.12.050)

Connection of streets with highway: "No plan for replatting, subdivision or dedication of any area shall be approved by the BALD [county department of Building and Land Development] unless the streets shown therein are connected by surfaced road or street (according to county specifications) to an existing dedicated highway of the county." (19.08.120)

Although the term "highway" is not specifically defined, a "primary highway" is defined as follows within the King County Code:

Primary Highway: "A primary highway is a street or section line road of great continuity which serves or is intended to serve as a major trafficway within the county and is designated in the master plan as a limited access highway, major thoroughfare, parkway or other equivalent term to identify those highways compromising that basic structure of the highway plan." (19.04.250)

Everett and Tacoma are two cities which have very specific standards for street designs within subdivisions. Within the Title 18 subdivision provisions of the Everett City Code, Chapter 18.24 describes "Land Division Requirements", with specific criteria for street

design addressed under section 18.24.100 ("Street Improvements"):

A. "Whenever a division or redivision of land is on an existing public street, such frontage shall be improved to current city standards, except if all the following conditions exist: the division of land is four or less dwelling units, has a minimum of eighteen feet of asphalt pavement, gravel shoulder, temporary drainage, and does not have the potential for more than four dwelling units or additional improvements are not needed to provide a smooth transition...

B. "Local streets shall be laid out to discourage use by through traffic.

C. "The use of curvilinear streets, cul-de-sacs, and short loops shall be encouraged where such use will result in a more desirable layout.

D. "Proposed streets shall be extended to the boundary lines of the tract to be subdivided and short subdivided...

E. "Access to arterials. When a division or redivision of land borders on or contains an existing or proposed arterial, the city may require that access to such streets may be limited, such as common lot access points and lots fronting on interior streets.

F. "Dead End Streets. All permanent and temporary dead end streets will be limited in length and shall provide a turnaround in accordance with city standards.

G. "Street Standards: All streets shall be built to current city standards and meet minimum requirements for right-of-way width, pavement width, sidewalks and off-street parking as defined in classification of streets. The minimum requirement for each street classification shall be based on the maximum potential number of dwelling units served by the logical extension of common streets to serve other land. The public works director will have the authority to deviate from construction and street classification standards."

Minimum street standards in Everett are summarized in Table 12.

In Tacoma, specific criteria for street design are also addressed in Chapter 13.04 of their Land Use Regulatory Code ("Platting"). Sections 13.04.160 through 13.04250 describe required street widths, street design standards, block sizes, and other elements:

13.04160 Street widths: (a) The widths for arterial streets shall conform to the widths designated on the major street plan and the specifications of the City of Tacoma. (b) The minimum width for residential access streets shall be sixty (60) feet, except in cases where the topography or other conditions make a street of this width impractical the City Council may modify this residential access street regulation.

13.04.170 Roadways. Roadways for arterials shall conform to the major street plan and specifications of the City of Tacoma. Roadways for one-way residential access streets shall not be less than sixteen (16) feet in width. Roadways for two-way residential access streets shall not be less than thirty-two (32) feet, provided, however, where topographical conditions...

13.04.190 Dead-end streets. In general dead-end (cul-de-sac) streets should not be longer than five hundred feet and shall terminate in a turn-around with a minimum center radius of forty feet.

13.04.220 Alleys. A minimum width of an alley in a residential block when platted shall be twenty feet. Alleys may be required in the rear of commercial and industrial districts, and where required shall be at least twenty feet wide. The corners of alley intersections shall have a radius of not less than twelve feet at curb lines and/or edge of pavement.

TABLE 12. Minimum City Street Standards (Everett)

Classification of Streets	Max. No. of Dwelling Units Served	Max. Avg. Daily Trips	Min. Right-of-Way (ft.)	Curb to Curb Pavement Width (ft.)	Sidewalk	Off-Street Parking Spaces
Access Streets (Res.)						
Short Subdivisions Only	9		40	24	1 - 4 (units) Optional	4
Permanent Dead End Cul-de-Sac					5 - 9 (units) Required	
Local Access "A"	40	under 400	50	28	Required	4
Local Access "B"	100	under 100	50	32	Required	4
Arterials						
Collector Arterial	Over 100	Over 1,000	60	36	Required	Varies
Minor Arterial	Varies	1,500 to 15,000	60	44	Required	Varies
Principal Arterial	Varies	15,000 to 50,000	80	48	Required	Varies

(Source: Everett City Code 1990, Section18.24)

13.04.250 Blocks. Block length shall not exceed one thousand three hundred twenty feet nor be less than four hundred feet between street lines. The width of blocks shall be such as to allow two tiers of normal blocks. In blocks over eight hundred feet in length, there shall be a pedestrian walkway of not less than ten feet in width near the middle of the block. The requirements contained in this section may be waived upon a finding by the City Council that traffic requirements, land use requirements, topographic conditions or other unique conditions are such that other block lengths and or widths are desirable in keeping with good planning principles and further provided that the requirement of pedestrian walkways may be waived or additional walkway required ...

In Washington state, these typical specific design provisions are imposed by local jurisdictions, while the subdivision of land is controlled largely through state law. In contrast, California grants substantial subdivision authority to local jurisdictions:

> Regulation and control of the design and improvement of subdivisions are vested in the legislative bodies of local agencies. Each local agency shall by ordinance regulate and control subdivisions for which this division requires a tentative and final or parcel map... (RCCA 66411 emphasis added)

"Design" is also precisely defined:

'Design' means: (1) street alignments, grades and widths; (2) drainage and sanitary facilities and utilities, including alignments and grades thereof; (3) location and size of all required easements and rights-of-way; (4) fire roads and firebreaks; (5) lot size and configuration; (6) traffic access; (7)grading; (8) land to be dedicated for park or recreation purposes; and (9) such other specific requirements...(RCCA 66418)

Further authority is granted to local jurisdictions to require specific amenities within subdivisions:

There may be imposed by local ordinance a requirement of dedication or irrevocable offer of dedication of land within the subdivision for local transit facilities such as bus turnouts, benches, shelters, landing pads and similar items which directly benefit the residents of a subdivision if (a) the subdivision as shown on the tentative map has the potential for 200 dwelling units or more if developed to the maximum density shown on the adopted general plan or contains 100 acres or more, and (b) the governing body finds that transit services are or will within a reasonable time period be made available to such subdivision... (RCCA 66475.2)

Street Level Design

In Washington's five largest cities, Seattle, Spokane, Tacoma, Bellevue and Everett, the zoning codes require or encourage street level retail and other street level features along select streets in their Central Business Districts. Seattle and Bellevue have extensive requirements for street level retail. Spokane's proposed code includes an elaborate point system that encourages a wide variety of street level features including art, landscaping etc. Everett's code requires "pedestrian-oriented frontage" along select areas of its Central Business District (B-3) zone. Within its Business (B) zone, Tacoma includes street level retail as one of two required "public benefit features."

Site Design: Notable Policies and Projects

Setbacks and Site Development

The City of Vancouver, WA has established an ordinance which combines site design amenities with parking requirements. The ordinance encourages developers to construct a "weather-protected pedestrian walk" between a parking facility and a building or development. If provided, the area occupied by the covered walkway may be eliminated from the building's gross floor area prior to calculating the number of required parking spaces (Sec. 20.81.313, Ord. M-2254). The zoning code for downtown Vancouver also includes a "downtown rain protection combining district", which is intended to "achieve a weather-protected system of pedestrian circulation which will enhance the economic vitality of the downtown core area, and which will provide a needed amenity for employees, visitors, and shoppers, and in order to protect the public health, safety and welfare, rain protection features shall be required along street frontages in a certain area" (Sec. 20.59.210, Ord. M-2254 part).

The Bellevue Community Retail Design zone is a unique example of a zone outside the CBD which does require specific pedestrian connections and amenities. The requirements of this floating zone extend over all Neighborhood Retail and Community Retail zones in Bellevue. Specific site design requirements of the Community Retail Design zone include the following:

1. "If the property is located at the intersection of two arterial streets, the site development should incorporate a special corner feature at the corner of the site.....If the property is not located at an intersection, a similar feature should be considered in conjunction with a transit stop or at the primary access point to the site.

2. "In multiple building complexes, buildings should be located to facilitate safe and comfortable pedestrian movement between buildings. On sites which are adjacent to other properties within the Community Retail Design District, building location should be

chosen to facilitate pedestrian and vehicular connections to buildings on those adjacent properties. Consideration should be given to locating buildings closer to the public street with entrances to the buildings from the public sidewalk, with no intervening parking or driving area...

3. "Opportunities should be found for safe, convenient and pleasant pedestrian connections to existing transit facilities. Where needed, shelters and lay-bys for transit vehicles should be incorporated into the site development.

4. "Walkways, 8 feet minimum width, shall be provided from the public sidewalk or right-of-way to the building. At a minimum, walkways shall be located to connect focus points of pedestrian activity such as transit stops and street crossings to the major building entry points.

5. "Bicycle racks shall be provided on site. Facilities for a minimum of ten bicycles shall be provided for developments having 100 or fewer parking stalls. For each 100 additional stalls, facilities for five additional bicycles shall be provided.

Seattle is noteworthy in its use of required site design elements that encourage bicycle use, principally by including provisions for bicycle parking. Within four multi-family zones (L2, L3, MR, and HR), Seattle requires bicycle parking based on the number of housing units. Bicycle parking spaces are also required of all institutions in multifamily zones, at the rate of 5% of the number of required vehicle spaces. As part of this requirement, the Seattle code specifies that "(a)ll bicycle spaces should be sheltered from the weather, visible from the institution, and conveniently located" (Seattle Land Use Code, Section 23.54.015 - "Required Parking"). Seattle also requires bicycle parking spaces in neighborhood commercial zones (NC1, NC2, NC3, and C1) based on 10% of the number of required off-street auto parking spaces. "Major Institutions" (including the University of Washington and the surrounding area) are zoned under a "Major Institution Overlay Zone" which in addition requires bicycle parking based on 2% of the number of employees at peak hour for medical institutions, and 10% of the maximum number of students and 5% of the number of employees at peak hour for educational institutions. (Seattle Land Use Code, Section 23.54.016 "Major Institutions-Parking and Transportation")

Street Systems

Laguna West in California is an example of a pedestrian pocket which features a modified street grid that provides more direct pedestrian as well as vehicular links throughout the town, rather than the circuitous street systems which are typical of suburban developments. Traffic studies estimate that a significant reduction in average vehicle trips (AVTs) could be realized as a result of the street design of Laguna West. (Gordon and Peers 1991)

Street Level Design

Within the proposed new Zoning Code for the City of Spokane (to be adopted in September/October 1991), streetscape features are primary requirements within the new Central Business District Core (CORE) zone. Detailed examples are drawn from this code to illustrate the complexity and detail of land use policies for a city Central Business District. The proposed Spokane code notes:

> Buildings and streetscape features that contribute to an interesting and inviting street level are desired downtown to avoid a monotonous environment; to restrict fortress-like facades at the street level; to provide a pleasant, rich and diverse experience for pedestrians; and to encourage a high level of street level activity...To meet this goal of achieving an inviting, active and safe downtown street level, new development projects and redevelopment of existing sites which is more than 60% of the assessed value of improvements prior to to redevelopment shall provide street level features from the following list equal to 25 or more total points value; except that, redevelopment of buildings existing at the time of adoption of this code with frontages no

greater than 50 feet shall provide features equal to 20 or more total points value. (Spokane Zoning Code: Final Draft, Section 11A.20.160E)

Points are awarded based on the following "street level features", where each feature has a different number of associated points that may be accumulated by the development:

1. Building Entries: Each street level pedestrian entry (2 pts. ea. 10 pts max.)
2. Marquees or Other Entry Coverings: (2 pts ea. 6 pts. max.)
3. Pedestrian Shelter: Arcades, canopies, etc: (9 pts.)
4. Windows: At least 50% of the building length and 25% of the exterior wall area on the ground floor abutting sidewalks, plazas or other public spaces or rights-of-way to windows affording views into interior space: (10 pts.)
5. Landscaping - 75% of Building Length
6. Water Features: 5 pts./feature/frontage, up to two frontages
7. Public Seating: 1 pt. for every 4 chairs or 10 feet of other seating space; 5 pts, maximum)
8. Bicycle Parking: 2 pts. for each 5 bicycle parking spaces; 4 pts. maximum
9. Sidewalk Cafes: 15 pts.
10. Public Open Spaces: Plazas, courtyards, etc. (5 pts.)
11. Enclosed Plazas/Atriums: (5 pts.)
12. Building Pass-Through: "A highly visible and easily identifiable street level pedestrian route centrally located through a building that conveniently connects one street with another and is intended for general public access: " (6 pts.); "Pass-throughs that are accessible to the public 24 hours a day: "(4 pts. additional)
13. Improved Alleys: "Adjacent alleys that are redeveloped and enhanced for pedestrian circulation and open space." (5 pts.)
14. Street Level Public Rest Rooms (5 pts.)
15. Street Level Day Care (5 pts.)

In addition, the following street level features are also included in the proposed Spokane Zoning Code; specific implementation details require the approval of a Design Review Committee:

Art: artwork/frontage (5 pts.)
Lighting: (1-5 pts.)
Distinctive Signs : (2 pts.)
Landscaping: - 50% of Building Length (i.e. reduced requirement) (8 pts.)
Facade Articulation/Detail: (10 pts.)
Facade Preservation: (up to 20 pts.)
"Other" Street Level Amenity: (1-5 pts.)

Master Planned Developments

Master Planned Developments and Land Use Policies

The term "master-planned development" is not easily defined, although it has become a common term in the urban planning profession. It can include at least two types of developments: Planned Unit Developments (PUDs) and Master-Planned Communities (MPCs):

Planned Unit Developments

A Planned Unit Development (PUD) is a "floating zone" which overlays an underlying, standard zone. The 14 jurisdictions included in this report all have provisions for PUDs, although the titles vary (Planned Residential Development, Planned Development, etc.).

PUD code provisions are generally designed to offer greater flexibility in the development of compatible larger-scale residential developments. For example, King County defines the purposes of a Planned Unit Development as follows:

a. To produce a development which would be as good or better than traditional lot by lot development on either consolidated lots or unsubdivided property.
b. To correlate comprehensively the provisions of this title and other resolutions and codes of the county, to permit developments which will provide a desirable and stable environment in harmony with that of the surrounding area.
c. To permit flexibility that will encourage a more creative approach in the development of land...
d. To permit flexibility in design, placement of buildings, use of open spaces, bicycle and pedestrian circulation facilities... (King County Code Chapter 21.56 "Planned Unit Development")

Master-Planned Communities

Master-Planned Communities are generally considered to be larger and more complete forms of MPDs. In a recent study of master-planned communities (MPCs) entitled Master-Planned Communities, edited by University of Washington Professor Anne Vernez Moudon, she summarizes the difficulty of defining a master-planned community:

> It is important to understand that though the term "master-planned community" is applied to large-scale developments, actual sizes of master-planned communities vary substantially. They are only large when compared to regular suburban subdivisions, and the services they offer are highly dependent on the size of the market they create...(Moudon 1990, 11)

Moudon cites previous studies that use various criteria of area and population to define new communities, and goes on to

mention the potential significance of these variations in definition:

> For our survey of the Puget Sound Region, we selected a threshold of 700 acres....The range of densities found in master-planned communities also effects the eventual delivery of services. A 3,000-acre community can house between 8,000 and 21,000 people, depending on the density of development, and hence physical size alone will not predetermine the range of amenities. Such variations in population make it difficult to generalize about the characteristics of master-planned communities and the related level of their urban-like services. (Moudon 1990, 11)

Despite the definitional complexities, Moudon cited 14 MPCs (700 acres or larger) in the Puget Sound Region which have been or are currently being developed. According to the research of Lawrence Mann at the University of Arizona, 600 MPCs (1,000 acres or larger) have been developed in the United States since the 1960s.

From a transportation standpoint, a master-planned development emphasizes as its underlying concept a more complete design incorporating a number of the elements of land use policy discussed in earlier sections of this study, such as residential and activity center densities, site design, mixed use, limited parking, etc., to create a large development or even entire community which is conducive to multiple modes of transportation.

Master-Planned Developments and Transportation

MPDs are of particular interest from a transportation point in view in at least three ways. First, the often more compact designs of planned communities can help to achieve thresholds of residential density that will increase the feasibility and efficiency of public transportation service to the development. Second, a well-designed development that considers project-wide issues of internal circulation encourages the use of alternative modes such as bicycling and walking within the development, and improves access to transit services. Third, appropriate inclusion of an easily accessible mix of land uses (e.g. grocery stores, day care, other services) within a planned community reduces the need to travel outside the immediate area, travel that in all likelihood would involve the use of automobiles; in addition, well-designed support of internal circulation via non-automobile modes (bicycle and walking) to such land uses also increases the likelihood that the number of auto trips would be reduced.

Thus, the combination of higher residential densities and easier access to transit services by bicycle or on foot increases the attractiveness of public transportation and improves transit's cost-effectiveness, while reductions in travel demand in turn reduce the impact of a new development on the surrounding transportation network. In many respects, the MPD concept may be viewed as a synthesis of many of the individual land use-transportation linkage elements discussed in this study.

It should be noted, however, that while the MPD concept may emphasize, for example, adequate levels of residential density to support public transportation systems as a central theme in the design of planned communities, the reality of implementation often deviates from this goal. For example, while master planned communities generally do allow higher residential densities than most traditional developments, a recent study of master planned communities in the Puget Sound region concluded that their residential densities are usually "...too low to support public transportation", and went on to note that "master-planned communities are not conducive to supporting public transportation systems because they are usually located at the fringe of metropolitan areas..." (Moudon ed. 1990, 99). Moudon summarized the relationship between typical MPCs and transportation in Master-Planned Communities:

> The design of master-planned communities is clearly anti-urban: concentration and mix of functions and social classes are only reluctantly considered. Yet as alternatives to

suburban sprawl, these communities can appear to be urban-friendly: built at higher densities, they provide more amenities than most suburban subdivisions. They also compare favorably to exurban development, which typically occurs on uncoordinated three-to five-acre tracts. Developers want high densities and are willing to pay for many of the resulting impacts. Ironically, the public and its authorities work to reduce the developers' density targets. In the end, the densities achieved rarely reach levels where urban services are likely to become available within close reach of the residential areas...

Cars remain the essential means of transportation. Pelican Bay in Florida and the Village of Woodbridge, with 7.63 and 9.3 dwelling units per acre respectively, are compact enough to permit basic public transit service.....and all of the Puget Sound master-planned communities (with the single exception of Blakely Ridge, which is still in the planning stages) are below the seven units per acre experts deem necessary for cost-effective transit. (Moudon 1990, 13)

Master Planned Developments: An Overview of Land Use Policies

Planned Unit Developments (PUDs)

All 14 study jurisdictions surveyed have explicit provisions for Planned Unit Developments, or floating zones that address similar projects, although the titles and specific provisions vary in each jurisdiction. The following is a summary of the PUD provisions, which includes the relevant title and code section, the applicability of the PUD designation, and the density bonus provisions.

Clark County
Title: "Planned Unit Development (PUD)"
Code Section: 18.405
Underlying Zones/Uses to Which PUD is Applicable: "Any use consistent with the Comprehensive Plan and permitted in any of the zone districts contained in this Ordinance may be permitted in planned unit developments..." Planning Commission approval is needed for mixed use developments.
Maximum Density Permitted: 20% increase in "gross" density
Bonus Density System: None
General Requirements: Open space, detailed landscape and architectural drawings at time of submittal
Minimum Acreage to Qualify as a PUD: 6 acres, smaller developments subject to approval by Planning Commission

King County
Title: "Planned Unit Development (PUD)"
Code Section: 21.56
Underlying Zones/Uses to Which PUD is Applicable: Residential PUDs may locate only in F-R, RS, RD, RM, S-E, and S-R, zones. Uses allowed in non-residential PUDs are limited to those allowed in the underlying zone.
Maximum Density Permitted: Not specified for residential - Permitted lot coverages and FARs of underlying zones shall not be exceeded.
Bonus Density System: 23 specific bonus provisions.
General Requirements: Open space.
Minimum Acreage to Qualify as a PUD: One acre.

Kitsap County
Title: "Planned Unit Development (PUD)"
Code Section: Section 14
Underlying Zones to Which PUD is Applicable: All zones except Mining (M)
Maximum Density Permitted: Varies per zone.
Bonus Density System: None.
General Requirements: Open space.
Minimum Acreage to Qualify as a PUD: None specified.

Pierce County
Title: "Performance Overlay Zone (POZ)"
Code Section: 18.83
Underlying Zones/Uses to Which is Applicable: All zones: Uses are limited to those approved in the underlying zone.
Maximum Density Permitted: Twice the density permitted by the underlying zone.
Bonus Density System: 4 criteria: Low and moderate income housing, mixed housing

types, a school site, and recreation facilities.
General Requirements: None.
Minimum Acreage to Qualify under POZ: None specified.

Snohomish County
Title: "Planned Residential Development":
Code Section: 18.51
Underlying Zones/Uses to Which PRD is Applicable: Permitted only as an overlay on the residential zones Multiple Residential (MR), Low Density Multiple Residential (LDMR), Residential (R-20,000) (R-12,500) (R-9,600) (R-8,400) (R-7,200), and Suburban Agriculture (SA-1). "One acre of land for every three hundred dwelling units may be used for neighborhood business purposes. Such other uses as are permitted in the underlying zone are permitted herein.."
Maximum density permitted: 120 percent of the underlying zone.
Bonus Density System: None.
General Requirements: Open space and recreation facilities
Minimum Acreage to Qualify as a PRD: none specified
Special Requirement: "Retirement Housing PRDs" are also allowed, and these developments must include a public transit stop with transit providing, "frequent off-peak hour and weekend service; and a "special transportation program, such as a public or private vanpool..." (Snohomish County Code, Section 18.51.057)

Spokane County
Title: Planned Unit Development
Code Section: 14.704
Underlying Zones to Which PUD is Applicable: "It (PUD) is intended to be used in conjunction with any other zoning classification except the Exclusive Agricultural (EA), General Agricultural (GA) and the Mining (M) zones." Permitted uses are those permitted in the underlying zones.
Maximum Density Permitted: 60% site coverage exclusive of right-of-way designations.
Bonus Density System: 17 bonus criteria under the categories "Common Open Space", "Environmental Concern", "Internal Circulation and Parking", "Public Service and Facility Availability", "Other".
General Requirements: Open space.
Minimum Acreage to Qualify as a PUD: None specified.

Bellevue
Title:"Planned Unit Development (PUD)"
Code Section: 20.30D
Underlying Zones/ Uses to Which PUD is Applicable: Any Residential (R) or Open Use (OU) zone. "In no case may a Planned Unit Development include uses which are not permitted by the zoning of the subject property..."
Maximum Density Permitted: 10% greater than underlying zone - no density increase is allowed in the Open Use (OU) zone
Bonus Density System: Not specified, only that, "the design of the development offsets the impacts of the increase in density; and the increase in density is compatible with existing uses in the immediate vicinity of the subject property."
General Requirements: Open space and recreation space
Minimum Acreage to Qualify as a PUD: none specified

Bremerton
Title: "Planned Unit Development (PUD)"
Code Section: Section 10.
Underlying Zones/Uses to Which is Applicable: Uses are limited to those allowed in the underlying zones.
Maximum Density Permitted: Based on maximum units/gross acre by percentages of open space: Example, based on 15%, 20%, or 25% of the PUD devoted to open space, 3, 4, and 5 units/gross acre are allowed if the underlying zone is SF-1
Bonus Density System: None.
General Requirements: Open Space
Minimum Acreage to Qualify as a PUD: One acre.

Everett
Title: "Planned Residential Development (PRD)"
Code Section: Section 32
Underlying Zones/Uses to Which PRD is Applicable: All residential zones - uses

limited to those allowed by underlying zone.
Maximum Density Permitted: 15% greater than underlying zone or that specified by the Everett General Plan.
Bonus Density System: Three general criteria: open space, project siting, and design features.
General Requirements: Open space - considered but not required.
Minimum Acreage to Qualify as a PRD: 2 acres.

Renton
Title: "Planned Unit Development (PUD)"
Code Section: Chapter 15
Underlying Zones/Uses to Which PUD is Applicable: Residential (G-1) (R-1) (R-2) (R-3) and (R-4)
Maximum Density Permitted: (G-1) 1.25 du/acre; (R-1) 6 du/acre; (R-2) 12 du/acre; (R-3) 25 du/acre; R-4 (35 du/acre)
Bonus Density System: 11 specific criteria
General Requirements: General guidelines only.
Minimum Acreage to Qualify as a PUD: "no minimum site area"...Section 4-15-8

Seattle
Title: "Planned Residential Development (PRD)"
Code Section: 23.44.034
Underlying Zones/ to Which is Applicable: single family zones as, " a council conditional use"
Maximum Density Permitted: 20% increase over underlying zone
Bonus Density System: not specified, but includes low-income housing, open space, and day care or recreational facilities
General Requirements: General guidelines only.
Minimum Acreage to Qualify as a PRD: two acres

Spokane (existing code)
Title: "Planned Unit Development (PUD)"
Code Section: 11.19.361
Underlying Zones to Which PUD is Applicable: "Any zone other than the Agricultural Zone (AG) where the hearing examiner judges the development to be suitable."
Maximum Density Permitted: 30% above underlying zone
Bonus Density System: 8 general headings without specific densities bonuses: "The allocation of bonus densities should be based upon a comprehensive review of the entire project." General headings are: "Preservation of Agricultural Land and Open Space and Natural, Historical, and Cultural Features"; "Public Service and Facility Availability"; "Energy Efficiency"; "Private Recreation Facilities"; "Environmental Design"; "Economy of Housing"; "Provision of Innovative Design".
General Requirements: None - only general guidelines.
Minimum Acreage to Qualify as a PUD: 2 acres

Spokane ("Final Draft" of proposed code)
Title: Planned Unit Development
Code Section: 11A.30.170
Underlying Zones to Which PUD is applicable: Agriculture (AG), SemiRural Residential (SRR 5), all residential zones, Service Commercial (SC-1) (SC-2), General Commercial (GC), Central Business District Core (CORE), Central Business District (CBD), Light Industrial (LI), and Heavy Industrial (HI).
Maximum Density Permitted: specified only as Fifty maximum bonus points
Bonus Density System: 15 bonus criteria - bonus system applies only to a residential PUD; bonuses may be used to develop commercial property within a residential PUD and/or to increase the density of residential development
General:Requirements: All PUD applications shall be subject to review by the Design Review Committee
Minimum Acreage to Qualify as a PUD: One acre, although no minimum is established in R 2,000, R 1,000, any non residential zone, or if uses proposed are allowed outright in underlying zone

Tacoma
Title: "Planned Residential Development (PRD)"
Code Section: 13.06.245
Underlying Zones/Uses to Which PUD is Applicable: One-family Dwelling (R-1) (R-

2), Two-Family Dwelling (R-3), Multiple-family Dwelling (R-4) (R-5), Low-density Multiple-family Dwelling (R-4-L). Townhouses are permitted in all res. zones.
Maximum Density Permitted: varies per zone based on gross site area per dwelling unit
Bonus Density System: None - only general guidelines.
General Requirements: Reclassification as a PRD is required.Open Space.
Minimum Acreage to Qualify as a PRD: varies between two and ten acres depending on underlying zone being reclassified

Vancouver
Title: "Planned Developments"
Code Section: 20.72
Underlying Zones to Which PUD is Applicable: Residential zones R-1-5, R-1-6, R-1-7.5, R-1-10, and R-1-20.
Maximum Density Permitted: Up to next densest res. zone.
Bonus Density System: None
General Requirements: Open space, detailed landscape and architectural plans
Minimum Acreage to Qualify as a Planned Development: 2 acres

All 14 jurisdictions allow an increase in residential density based on the PUD process. Seven of the 14 jurisdictions with PUD provisions allow an increase in residential density based on specific "density bonuses". Improved access to transit, pedestrian systems, inclusion of various services, access to shopping, and affordable housing are typical developer options that may result in an increase in residential density. For example, King County specifies 23 different provisions which allow increases in residential density beyond the base density allowed by the underlying zone. Some of these provisions include:

a. Fifteen one-hundredths unit per acre bonus if public transit is available within walking distance (approximately one-half mile) and the service is provided twice hourly during morning and evening peak hours;
b. Fifteen one-hundredths unit per acre bonus if provision is made for an internal bike and pedestrian system obviously separated from heavy auto traffic facilities;
c. Fifteen one-hundredths unit per acre bonus if offsite convenience shopping facilities are functionally accessible within reasonable walking distance (approximately one-half mile);
d. Fifteen one-hundredths unit per acre bonus if the circulation plan is such that the traffic generated by the project will put no substantial additional load on the surrounding local access street system...

All jurisdictions vary in the way in which density bonuses are calculated for PUDs. Table 13 summarizes nine common amenities for PUDs within 15 jurisdictions (the 14 study areas plus the proposed code for Spokane). The table indicates how many of the 15 jurisdictions either require the amenity or provide density bonus incentives if the amenity is included. From this table it is evident that many transportation-related aspects, such as site design, mixed use, and transportation demand management, are addressed in typical PUD regulations (another frequent provision, affordable housing, is addressed in a later section of this study entitled Jobs-Housing Balance). However, density bonuses can also be granted for amenities that are not directly associated with transportation-related elements. Examples of these amenities include crime prevention programs, inclusion of "exceptional landscape treatment", and other design features, as seen in Table 14.

Given the large number of density bonus provisions, the actual calculation of allowable residential density is sometimes a complicated process. In King County, for example, the allowable density increase is computed by multiplying the density bonus points by a zone-specific multiplier factor, and adding the result to a base density value that is generally lower than the normal non-PUD density (thus requiring the accumulation of a minimum number of bonus points just to rise to the level of density that would be allowed if PUD provisions were not in place). Specific

TABLE 13. Summary of PUD Requirements - Density Bonuses

Amenities	Number of areas with Requirement	Number of areas with Density Bonus
Affordable Housing	none	4
Mix of Housing Types (i.e. single and multi-family)	Not Required, but allowed in Typical PUDs	4
Access to a Public School (i.e. 1/4 mile)	none	4
Pedestrian/Bike Systems	none	4 (other than typical requirements)
Access to Retail and Other Services	none	4
Child/Day Care Within Development	none	3
Access to Transit (i.e. 1/4 mile)	none	4
Program to Encourage Transit and Ridesharing	none	1
Payment to Transit Authority per Housing Unit	none	1

TABLE 14. Summary of PUD Requirements - Non-Transportation Bonuses

Amenities	Number of areas with requirement	Number of areas with Density Bonus
Open Space	10	5
Specific Recreation Facilities	none	6
Crime Prevention Program	none	3

PUD standards for the 14 study jurisdictions are included in Appendix B of this study.

Master Planned Communities (MPCs)

The topic of "Master Planned Communities" was the theme of a two-day conference which was held at the University of Washington in October, 1989. The research from this conference included a description of 14 master planned communities that have been developed in the Puget Sound region. A general observation was that land use controls regulating Master Planned Communities vary with each jurisdiction; cities typically develop guidelines in their comprehensive plans. For example, Kitsap County reviews MPCs as Planned Unit Developments (PUDs). King and Snohomish counties have specific guidelines for approving MPCs; within its 14 Community Plans, King County specifies areas in the county where MPCs may be developed. Pierce County does not explicitly recognize MPCs, but does allow for a development whereby the county "enters into a concomitant agreement with the developer." (Moudon 1989)

Master Planned Developments: Notable Policies and Projects

Planned Unit Developments

A unique approach to encourage additional residential density is being considered in the proposed new zoning code for the city of Spokane. This proposed code describes a system of density bonuses which are based on a point system and certain "bonus criteria", and includes several specific links to transportation features. Examples of

bonus criteria include the development of housing adjacent to a transit stop, or the development of housing within 1/4 mile of an existing neighborhood-serving commercial district of at least one acre and two or more businesses. Unique to the proposed Spokane Code is this provision: If the developer commits a portion of the development budget to providing transit facilities, 4 bonus points are given for each increment of $100 per dwelling unit donated to the Spokane Transit Authority, to a maximum of 20 points. These bonus points are then entered into a formula which calculates the final allowable density. The maximum number of bonus points is 50, with each point corresponding to a 1% increase in density over the base zoning. The existing Spokane Zoning Code includes a PUD bonus system, but without the point system and explicit transit and service criteria.

Master Planned Communities

Harbour Pointe

Harbour Pointe is a Snohomish County development by the Harbour Pointe Limited Partnership. The concept for Harbour Pointe differs from other master planned communities in the Puget Sound Region, in that the development will include 6 million square feet of employment facilities, primarily for the Honeywell Marine Division. At the University of Washington MPC conference, the Harbour Pointe development in Snohomish County was described as "truly a mixed community with a variety of employment, housing and recreational uses." Completion of Harbour Pointe is expected in 1994-95 (Moudon ed. 1990, 164).

Seaside, Florida

Seaside, Florida is a new master planned community which was originally established in 1978, and continues to be developed today. The town was designed by architects Andres Duany and Elizabeth Plater-Zyberk; original estimates were for completion in approximately 1993. Seaside features a dense, compact development with small residential lots, pedestrian oriented streets, and small public squares which feature public buildings and services for the community. Seaside has been a highly-publicized development, and has helped to generate considerable interest in "traditional neighborhood" or traditional town design (the street level design elements ofthis concept were described in the section on Site Design). Seaside is best described by its designers Duany and Plater-Zyberk:

> The site and the program were perceived to approximate the size and components of a small town, permitting a turning away from the methods of contemporary real estate development toward those of traditional American urbanism. To this end, the retail centre is conceived as a downtown commercial district, the conference facility doubles as a town hall and the recreation budget is dispersed to create civic amenities throughout the town. Civic character is further reinforced by reserving sites for public buildings such as a chapel, a schoolhouse, a fire station and a post office, to be shared by adjacent communities. The program is expanded to include a service station and a workshop district.
>
> A study of towns throughout the American South indicated that a community of genuine variety and authentic character could not be generated by a single architect. Building is therefore given over to a multitude of designers. The public buildings are to be freely designed by architects selected for their known sympathy with the regional vernacular. The private buildings will be commissioned by the individual citizen/buyer and subject to the provisions of a master plan and zoning code. These documents are intended to generate an urban environment similar to that of a small Southern town of the period prior to 1940. (Duany 1985, 71)

In contrast to the Harbour Pointe example, Seaside has developed into primarily a second-home, resort community.

Laguna West, California

Laguna West is a mixed use, master-planned community in Sacramento County, California that is an example of the "pedestrian pocket" concept. Architect Peter Calthorpe, the designer of Laguna West, defines a pedestrian pocket as, "a cluster of

housing, retail space, and offices within a 1/4 mile walking radius of a light rail station" (Boles 1991, 8). In Master Planned Communities, (Moudon ed. 1990), architects Peter Calthorpe, William Isley, and Douglas Kelbaugh compare the concept to that of the previous example, Seaside:

> Pedestrian Pockets are different from Seaside, the 'neo-traditional' town in Florida. While Seaside follows the principles of traditional town planning and captures the atmosphere of a small town, Pedestrian Pockets are a transit-oriented and regional approach to suburban development. They are also different from European new towns which are intended to be self-sustaining. Based on the combination of living and working, most new towns have been large developments which have required governmental support. Pedestrian Pockets are a part of a metropolitan network of towns and cities connected to the entire region in terms of work, recreation, and cultural activities. (Moudon, ed, pg. 71)

Laguna West is designed for 10,000 residents, and its planning and design employ several of the land use approaches described in this study as being conducive to increased public transportation usage and decreased dependence on the automobile. As discussed in the earlier Residential Densities section of this study, an average of 14 units per acre is planned for the entire development, with 20 units per acre around the Town Center. The street system of Laguna West is laid out in a tight pattern, with radial and grid patterns to provide direct pedestrian and vehicular linkages throughout the town. Special "Class 1 bikeways" that are separated from streets are planned for certain collector streets that lead from residential areas to the Town Center. This plan design contrasts with typical lower density subdivision layouts incorporating cul-de-sacs and other dead ends that reduce direct movement by pedestrians and bicycles, and inhibit the effectiveness of transit. In fact, a study concluded that the density and layout of Laguna West could result in a 20% to 25% reduction in vehicle-miles traveled when compared to typical suburban developments. (Gordon and Peers 1991)

Another key feature of its design is a transit center that is integrated into the central town center, and is to be connected to an eventual nearby light rail station via a shuttle service; this is in keeping with the concept of a pedestrian pocket as a node in a linked metropolitan network of pedestrian-oriented developments. Architect Calthorpe has stated, however, that a pedestrian pocket design without rail service would still be viable, suggesting that equivalent services would serve the same purpose:

> My earliest work in trying to define pedestrian pockets was directed at the light-rail system....but what I've found over the last six years is that the principles are equally meaningful without direct, mainline transit systems.....feeder buses or even carpools could be completely effective as long as the destination is a dense suburban center with a cluster of uses. (Thompson 1990, 58)

While development of this pedestrian pocket is continuing, the proposed light rail line connecting Laguna West and Sacramento has not yet been completed.

Metropolitan and Regional Planning

Metropolitan and Regional Planning and Land Use Policies

Throughout history most cities, while not truly designed or planned, nevertheless grew to form strong, singular centers which served a particular symbolic and functional purpose. In Greek cities the "Agora" was the defined city center, while the "Forum" was the nucleus of the Roman city. As religious and symbolic purposes became secondary to mercantile and secular functions, the Medieval city formed a market square as its center. Even in the 19th Century American city, the Central Business District or "CBD" was the focus of the city's cultural, mercantile, and employment functions.

As cities have grown in geographical area and population size, a clearly-defined, singular center has given way to a number of centers. These multiple centers have formed a new metropolitan and regional pattern of settlement that is variously described by leading critics as "complex", "multicentered", or "polynucleated". Planning programs now attempt to cope with this trend by promoting viable, interconnected centers that solidify metropolitan and regional areas. In the more successful schemes for such metropolitan areas and regions, a system of centers brings together multiple concepts such as intensely developed activity or employment centers, master planned communities, and pedestrian pockets, at the project, neighborhood, and city level, combined with internal and external transportation systems, to form a complete land use and transportation system.

Metropolitan and Regional Planning and Transportation

An important element of metropolitan planning of multiple urban and suburban centers is a transportation system that connects these centers. There are historical examples of metropolitan and regional schemes which were based on a system of towns or centers linked by a transportation network. At the turn of the century, "Garden Cities" were envisioned by Ebeneezer Howard as a means of relieving the desperate living conditions in industrial London. Following the second world war Patrick Abercrombie's "Greater London Plan" was based on a series of satellite cities surrounding London, with transit systems linking these new cities to London.

In recent years, Toronto and Vancouver B.C. have implemented metropolitan and regional plans which are based on a system of centers connected by public transportation systems. These plans and other recent metropolitan and regional planning schemes based on transit systems were studied in Transit and the Polycentric City by University of Washington Professor Jerry Schneider.

Metropolitan and Regional Planning: An Overview of Policies and Planning Organizations

Counties

Regional planning is often addressed by counties in their comprehensive plans. The

1985 King County Comprehensive Plan specifies a hierarchy of urban and rural centers:

> King County should encourage development of Urban Activity Centers to meet the needs of the region's economy and to provide employment, shopping, services.....Community Centers in Urban Areas should be designed to meet shopping and service needs of the surrounding community...Neighborhood Centers in Urban Areas should be designed to provide everyday shopping and services to a relatively small, nearby population...King County should work with Rural Activity Centers to establish realistic areas for expansion of these towns...Commercial and industrial development in Rural Areas should locate in existing Rural Activity Centers, to provide employment, shopping, services and housing opportunities that will reinforce these towns as rural centers... (King County Comprehensive Plan 1985, 8-12)

Regional Transportation Planning Organizations

There are twelve Regional Transportation Planning Organizations (RTPOs) in Washington. The RTPOs and the counties they serve are: Tri-County RTPO - Stevens, Ferry, and Pend Oreille Counties; Spokane Regional Council RTPO - Spokane and Whitman Counties; Palouse RTPO - Garfield, Asotin, and Columbia Counties; Benton-Franklin Governmental Conference RTPO - Benton, Franklin, and Walla Walla Counties; Yakima Valley Conference of Governments RTPO - Yakima County; Intergovernmental Resource Center RTPO - Klickitat, Skamania and Clark Counties; Thurston Regional Planning Council RTPO - Thurston County; Southwest Washington RTPO - Peninsula RTPO - Clallam, Jefferson and Mason Counties; Whatcom County Council of Governments RTPO - Whatcom County; Island/Skagit RTPO - Skagit County; Puget Sound Council of Governments RTPO - Snohomish, King and Pierce Counties. Kitsap County belongs to the Puget Sound Council of Governments and the Peninsula RTPOs.

Special Organizations

On occasion, special organizations have been developed to conduct area-wide transportation planning. The East Bellevue Transportation Study (EBTS) is an example of such a study, consisting of a regional group of citizens, jurisdictions, and governmental agencies. The EBTS studies long-range needs in a region bounded by I-405 to the west and Bel-Red Road to the north, Lake Sammamish to the east, and Newport Way to the south. The EBTS is overseen by a citizen group, the Transportation Advisory Committee, which is in turn supported by professional staff from Bellevue and outside consultants. The study is coordinated with the City of Issaquah, King County, Metro, the Puget Sound Council of Governments (PSCOG), and the Washington State Department of Transportation (WSDOT).

Metropolitan and Regional Planning: Notable Policies and Projects

The following are examples of efforts to establish citywide or regional plans which directly address issues of land use-transportation linkage. Each example includes one or more of the land use attributes described in this study, and considers the transportation impacts of future development.

Vancouver

In 1975 the Greater Vancouver Regional District published a plan entitled The Livable Region. This plan specifies five key elements:

1. "Achieve residential growth targets in each part of the region"
2. "Promote a balance of jobs to population in each part of the region"
3. "Create Regional Town Centers"
4. "Provide a transit-oriented transportation system linking residential areas, Regional Town Centres and major work areas"
5. "Protect and develop regional open space"

Toronto

In 1976 the Planning Department of the Municipality of Metropolitan Toronto completed a report entitled Metroplan: Concept and Objectives. The plan called for a

multi-centered urban structure with centers connected by transit. The Toronto Plan is based on the following criteria, which are similar to those of the Vancouver Regional Plan:

1. "It (the Plan) relieves the pressures for development now on the downtown core and concentrates the dispersed commercial enterprises into a manageable number of development nodes that can be effectively serviced by Metropolitan Toronto"
2. "It ties together new employment opportunities and housing in a way that provides increased opportunity for people to live in close proximity to their jobs (again, the theme of jobs/housing balance discussed later in this study)
3. "It broadens and enriches the economic and social base of the area municipalities by encouraging a range of activities that traditionally are found only in the Downtown.
4. "It reinforces the transit system, and provides for improved mobility for everyone throughout Metropolitan Toronto"
5. "It helps to ensure that services provided by both private and public agencies are accessible to the total population" (Schneider 1981)

Puget Sound

Vision 2020 was developed by the Puget Sound Council of Governments as a regional plan for the Puget Sound region. The Plan consists of a hierarchy of centers: a Regional Center (Seattle), Metropolitan Centers (Bellevue, Everett, Bremerton and Tacoma), Subregional Centers, Activity Clusters, Small Towns, and Pedestrian Pockets. Accompanying this hierarchy of centers, the Vision 2020 Plan specifies a hierarchy of public transportation systems to serve each center and to link the centers in a complete regional land use and transportation system. The plan further suggests requisite residential and employment densities and jobs/housing ratios needed at each center to support the concomitant transportation system (see Table 15).

TABLE 15. Summary of Land Use - Transportation Linkages for Vision 2020 Plan

Type of Center	Net CBD/USA Residential Density*, dwelling units/acre	Net Employee Density employees/ acre	Total Employment	Ratio of New Jobs to New Households	Transit Service (minimum)
Regional Employment Center (Seattle)	20/8 (or mixed-use)	500	n/a	1.5 - 2.5	Fixed-route rapid transit/ passenger-only ferry
Metropolitan Centers	20/8 (or mixed-use)	100	40,000	0.75 - 1.5	Fixed-route rapid transit/ passenger-only ferry
Subregional Centers Phase 1 (pre 2020)	20/8	50	40,000	0.75 - 1.5	Fixed-route rapid transit/ passenger-only ferry
Phase 2 (post 2020)	12/8	30	30,000	0.75 - 1.5	Express bus before 2020; rapid transit or passenger-only ferry after 2020
Activity Clusters	12/6	Minimum employment growth to serve population needs	Minimum employment growth to serve population needs	n/a	Local bus
Small Towns	4	"	"	n/a	Daily bus
Pedestrian Pockets	20	500	2,000	n/a	Fixed-route transit/ pedestrian access emphasis

(Source: Stanton-Masten Associates 1990)

* Central Business District/Urban Service Area

Jobs/Housing Balance

The concept of a jobs/housing balance in a given region has gained increasing prominence in urban planning discussions. The concept is based upon the notion that a proper mixture of housing and jobs within a particular area reduces traffic impacts from long commutes (because of the proximity of housing to jobs), improves the attractiveness and efficiency of public transit (by increasing the residential density), and addresses the issue of affordable housing (by requiring a percentage of housing units in price ranges that are compatible with regional employment opportunities). This jobs/housing balance is typically measured in terms of a ratio of jobs to dwelling units, as well as a ratio of affordable housing to total dwelling units.

In a study prepared for the Puget Sound Council of Government's Vision 2020 Report, Gary Binger, Planning Director of the Association of Bay Area Governments, defined jobs/housing balance in terms of "... a balanced community (which) is generally thought of as being self-contained and self-reliant, within which people live, work, shop and play" (Binger 1990). The term "balance" would seem to imply a ratio of one dwelling unit per worker. However, two-worker households and other local conditions must be considered when defining a specific ratio. In a 1983 study for a development in Placer County, California by the planning firm Gruen Gruen + Associates, a jobs/housing balance of 1.6:1 was deemed desirable when such factors were taken into account.

As mentioned earlier, it is not just housing, but affordable housing that is important in the jobs/housing balance. For example, 4 of the 14 study jurisdictions included in this study have specific provisions/incentives for providing affordable housing within Planned Unit Developments (PUDs). King County allows a density bonus if "the development features a broad range of unit rentals, including at least ten percent at or below ninety percent of the 'Fair Market Rent Levels for New Construction or Substantial Rehabilitation' for the Seattle standard metropolitan statistical area, as determined by the United States Department of Housing and Urban Development, Region 10, pursuant to Section 8, Title II, Housing and Community Development Act of 1974" (King County Code Chapter 21.56).

The city of Bellevue addresses affordable housing in their Comprehensive Plan. Section 21.G.125 "Affordable Housing" includes specific statistics which describe the costs of housing relative to incomes in Bellevue:

> While the City's employment is expected to grow by as much as 35% by the year 2000, our supply of vacant, developable land for housing will almost be depleted. As a regional job center, the City must assume the responsibility of providing housing for its workers with other jurisdictions in the region...
>
> In 1989, the average sales price for a home in Bellevue was $180,000. It would take

an income far in excess of the area median income to qualify to purchase this median priced home. At the same time, the average rent for an apartment in Bellevue was $580 per month..."

Based on 1989 income data, 35% of the City's existing residents earn less than 80% of the average area median income and, therefore, could not afford to purchase a home in the current market...

Bellevue's comprehensive plan goes on to describe "Goal 1" of the Housing Element of the Bellevue Comprehensive Plan as being "To create and maintain opportunities for affordable housing throughout the City." The supporting discussion notes that:

The City will look for opportunities to accommodate additional housing to improve Bellevue's ratio of housing and employment. Other communities on the Eastside have more housing than jobs. The City's intention is to do whatever is feasible to work in the direction of a balance of jobs and housing, recognizing that we will have to look to the larger Eastside as the area in which balance should be achieved.

To implement the affordable housing goals of their Comprehensive Plan, Ordinance 4269 was passed in Bellevue in July of 1991. This ordinance requires affordable housing in all new housing developments; interestingly, Bellevue cited as the basis for this new ordinance Chapter 17 of the 1990 state Growth Management Act, which requires, "the City to consider the housing needs of all economic segments of the community." In passing Ordinance 4269, Bellevue also considered, "the rationale for permitting higher density housing through the use of affordable housing incentives is to address the affordable housing needs of workers and residents in or near Bellevue." As with the Planned Unit Developments described earlier in this study, the Bellevue ordinance includes bonus densities for residential developments.

A summary of the Bellevue Ordinance 4269 is as follows: (only select paragraphs are included from the seven page ordinance)

A. The Ordinance applies to all new residential development, all new subdivisions, and all rezone applications.

B. At least 10% of the units in all new multifamily development proposals of ten units or greater must be affordable units. In addition, one bonus market rate unit is permitted for each additional affordable unit provided, up to 15% above the maximum density permitted in the underlying zoning district.

C. All rezone proposals for an increase in residential density must provide that at least 10% of the units buildable under the original maximum density be affordable units and that at least 20% of the units buildable as a result of the increase in density from the original maximum density to the total number of approved units must be affordable units. In addition, one bonus market rate unit is permitted for each of the affordable units provided to meet the minimum 10% requirement of the original maximum density, up to 15% above the original maximum density. [A sample calculation of this paragraph is included in the Appendix to this study]

D. An agreement in a form approved by the City must be recorded with King County Department of Records and Elections requiring affordable housing units which are required by this Section to remain as affordable housing for the life of the project. This agreement shall be a covenant running with the land, binding on the assigns, heirs and successors of the applicant.

E. Each low income affordable unit provided counts as two affordable units ...

F. This section applies to senior housing developments, including senior citizen dwellings and congregate care senior dwellings, but not including nursing homes...

"Affordable Housing" is defined as follows:

> Housing used as a household's primary residence for households whose income is less than 80% of the median annual income, adjusted for household size, as determined by the United States Department of Housing and Urban Development for the Seattle Metropolitan Statistical Area, and who pay no more than 30% of household income for housing expenses.

"Low Income" is defined as:

> Housing used as a household's primary residence for households whose income is less than 50% of the median income, adjusted for household size...

The affordable housing requirement within the Central Business District will be implemented in a staged program based on an adjusted definition of median income:

Number of Total Units	Median Income Level)
First 250 units	105% of median income
Second 250 units	100% of median income
Third 250 units	90% of median income
Subsequent units	80% of median income

The Bellevue Ordinance is similar to an Affordable Housing Ordinance which was passed in December, 1989 in Fairfax County, Virginia, which was in turn based on a similar program from Maryland County, Virginia which established an affordable housing program in 1980. The Fairfax County Ordinance allows a density bonus, beyond the density allowed by the underlying zone, of one additional market-rate housing unit for every three affordable housing units. The result is an addition of 12.5 percent in the number of affordable units which are required for most new housing developments in Fairfax County. Of particular interest to this study, local public opinion polls in Fairfax Co. showed that, "residents consider the problem of affordable housing second only to traffic". The system of density bonuses in the affordable housing ordinances of Bellevue and Fairfax County also provided a means for a developer to be compensated for being required to provide affordable units. Fairfax County attempted to pass an affordable housing ordinance earlier, in 1971, but "It was struck down by the Virginia Supreme Court because it forced developers to provide housing without compensation" (American Planning Association, "Fairfax Co." pg. 2).

Achieving a jobs/housing balance is an integral part of the 1989 Southern California Association of Governments (SCAG) growth management plan (GMP). Planners from the SCAG utilized a "mobility sensitivity" test to estimate that, "traffic growth could be cut by one-third if about 12 percent of the region's estimated job growth could be directed to housing-rich areas, and 6 percent of the region's estimated housing growth could be directed to job-rich areas." These specific transportation and land use goals are a provision of the SCAG's GMP which also specifies a jobs/housing ratio of 1.22 to 1 (Bookout 1990).

The Vision 2020 Plan as prepared by the Puget Sound Council of Governments describes a regional system of activity centers and a regional network of public transportation systems. The Vision 2020 plan also specifies a jobs/housing balance for each center. The chart summarizing the various centers, densities, and jobs/housing ratios is included in the previous section **Metropolitan and Regional Planning**.

Growth Management Considerations

As applied to land use planning, "growth management" may be defined as "a conscious government program intended to influence the rate, amount, type, location, and/or quality of future development within a local jurisdiction.....It should be noted that this definition, which in fact focuses on actively guiding growth, differs from the popular notion of stopping growth completely" (So, ed. pg. 69).

Prior to Washington's 1990 Growth Management Act eight states had passed extensive growth management legislation: Oregon, Florida, Maine, Vermont, Rhode Island, New Jersey, Georgia and California. The specific requirements of the current Washington Growth Management Act were noted in Section IIa of this report.

Early growth management efforts were often implemented by local jurisdictions to control the rate of growth. Petaluma, California, Ramapo, New York, Boulder, Colorado, and other cities instituted point systems for evaluating the overall quality of housing developments. These point systems were very similar to the system of density bonuses that are now offered in many Washington cities and counties (See Master Planned Developments). Whether used as a growth management tool or density bonus provision; a point system provides a potential means to encourage high quality development.

Some specific examples cited by Pivo in a 1989 article entitled "Performance-Based Growth Management" include: Bellevue's 1989 Traffic Ordinance; Florida's 1985 Local Government Comprehensive Planning and Land Development Regulation Act; Contra Costa County's 1988 Transportation Improvement and Growth Management Program; San Diego County's 1988 Regional Planning and Growth Control Measure; Carlsbad, CA's 1986 Public Facilities and Improvement Plan.

Of particular interest is the recognition of specific land use/transportation linkages in such legislation; in Washington state, community and regional planning policies will be required to address those linkages as described in the Growth Management Act. A notable example is the use of concurrency as a linkage mechanism.

Concurrency Requirements and Growth Management

Oregon and Florida were the first states to implement extensive growth management legislation in the late 1970s. Florida, in particular, provides an interesting case study in the potential problems of concurrency policies (see Transportation Programs). These shortcomings were summarized during the 1991 Washington Planning Association/Department of Transportation Planning Conference:

> Several issues have developed in Florida regarding concurrency. Concurrency requirements can have the effect of causing sprawl by pushing development into rural areas where capacity is not yet a

problem. The issue of providing adequate funding remains a key concern, including the issue of the percentage of funding that can be required of new development. There has been a proliferation of exemptions in some jurisdictions which negates the effect of concurrency review. One large development proposal can monopolize the available transportation capacity on a facility or in a subarea, which raises the issue of capacity reservation. Developments with vested rights do not have to comply with the concurrency review, but they do impact the level of service on the transportation system, and it is not always clear how to estimate their potential for actually being built. Finally, different methods for calculating level of service are being developed in order to be more responsive to local community needs.

During a presentation given at that 1991 APA/DOT conference Florida land use attorney Tom Pelham, who was the former director of that state's growth management implementation efforts, emphasized the need for Washington and other states to monitor and learn from the ongoing growth management programs in other states.

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LAND USE CODES, COMPREHENSIVE PLANS AND ORDINANCES

(all counties and cities are in the state of Washington unless noted otherwise)

Counties

Clark County: Clark County Code 1st Edition: A Codification of the General Ordinances and Resolutions of Clark County, Washington. Vancouver, WA: The County of Clark, State of Washington, 1978. (amendments to code updated to 11-90)

King County: King County Code: Zoning Title 21, 1988.

Draft Copy, King County Zoning Code. Seattle, WA: King County Building and Land Development, July 1991.

King County Comprehensive Plan. Seattle, WA. April 15, 1985.

Mitigation Payments System, 1991.

Kitsap County: The Kitsap County Zoning Ordinance, 1989.

Pierce County: Pierce County Code, Title 18, Pierce County Zoning Ordinance, 1985.

Snohomish County:	Snohomish County Code 1990.
Spokane County:	Zoning Code of Spokane County, Washington. Spokane, WA: May 1990 Printing.

Cities

Bellevue:	Bellevue Land Use Code (1990)
	Bellevue Comprehensive Plan (1990)
	Bellevue Ordinance 4269, July 1991.
Bremerton:	Bremerton Land Use Code: (new code not distributed to public - updated information confirmed with Bremerton Planning Dept., July 1991.)
Everett:	City of Everett Zoning Code. Title 19, Everett Municipal Code, 1990.
Gresham, OR:	City Zoning Code: Section 2.0430 - Transit Development Districts. Planning Department, Gresham, OR, 1988.
Portland, OR:	City Zoning Code: Chapter 33.450. "Light Rail Transit Station Zone."
	Portland Central City Plan. Portland. OR: Bureau of Planning, 1988.
Renton:	Revised and Compiled Ordinances of the City of Renton Washington. Weiser, ID: Sterling Codifiers, Inc. 1989.
Seattle:	City of Seattle Land Use and Zoning Code. Seattle, WA Book Publishing Company. (amendments updated through 3-91)
Spokane:	Spokane Municipal Code: Land Use. A Codification of the General Ordinances of the City of Spokane, Washington. Spokane, WA: City of Spokane, 1986.
	Spokane Zoning Code: Final Draft. City of Spokane Planning Department, September 1990.
Tacoma:	Land Use Regulatory Code, City of Tacoma, Washington Tacoma, WA: January, 1991.
Vancouver:	Municipal Code, City of Vancouver Washington. A Codification of the General and Permanent Ordinances of the City of Vancouver, Washington. Seattle, WA: Book Publishing Company. (amendments updated through 4-91).

Summaries of Selected Land Use Codes in Washington State

The following counties and cities were included in a survey of land use codes in Washington state (additional areas were also included if data was available):

Counties
Clark
King
Kitsap
Pierce
Snohomish
Spokane

Cities
Bellevue
Bremerton
Everett
Renton
Seattle
Spokane
Tacoma
Vancouver

The following land use/zoning code categories are included:

Residential Densities
Parking
Site Design: Setbacks
Employment Densities
Mixed Use Zoning
Planned Unit Development Zoning
Summary of Zoning Codes

Residential Densities

Low (Single Family)	High (Multi-family)
Clark County	
(RS)=0.1 unit/acre	(R-4)=10.9 units/acre
(R1-20)=2.2 units/acre	(A3)= 14.5 units/acre
(R1-10)=4.4 units/acre	(A2)=21.8 units/acre
(R1-7.5)=5.8 units/acre	(A1)=43.6 units/acre
(R1-6)=7.3 units/acre	
King County	
(SC)=0.1 units/acre	
(SE)=1.2 units/acre	
(RS15,000)=2.90 units/acre	(RTTownhouse)=12.1-27.2 units/acre
(RS9,600)=4.53	(RD3,600)=12.1 units/acre
(RS7,200)=6.05	(RM2,400)=18.1 units/acre
(RS5,000)=8.71	(RM1,800)=24.2 units/acre
	(RM900)=48.4 units/acre

The following base densities per acre are allowed in a planned unit development. Greater densities are allowed through a bonus system described in the section "Planned Unit Developments"

(SE)=1 unit/acre	(RD3,600)=8 units/acre
(RS15,000)=2.8 units/acre	(RM2,400)=12 units/acre
(RS9,600)=3.8 units/acre	(RM1,800)=16 units/acre
(RS7,200)=4.4 units/acre	(RM900)=16 units/acre
Kitsap County	
(Ru-2AC)=1 unit/acre	(R-12)=12 units/acre
(R-3)=3 units/acre	(R-18)=18 units/acre
(R-4)=4 units/acre	(R-24)=24 units/acre
(R-5)=5 units/acre	(R-30)=30 units/acre
(R-6)=6 units/acre	
(R-9)=9 units/acre	
Pierce County	
(SR-30)=1.2 units/acre	(RM-3.6)=10 units/acre
(SR-20)=1.75 units/acre	(RM-2.4)=15 units/acre
(SR-15)=2 units/acre	(RMH)=32 units/acre
(SR-12.5)=3.5 units/acre	
(RE-12.5)=3.5 units/acre	
(RE-9)=4 units/acre	
(RE-7.2)=5 units/acre	

The following maximum densities are allowed through the county's "Performance Overlay Zone":

(SR-30)=1.5 units/acre
(SR-20)=2.0 units/acre
(SR-15)=3.0 units/acre
(SR-12.5)=4 units/acre
(RE-12.5)=5 units/acre
(RE-9)=6 units/acre
(RE-7.2)=7 units/acre

(RM-3.6)=15 units/acre
(RM-2.4)=20 units/acre
(RMH)=32 units/acre

Snohomish County

(R-20,000)=2.1 units/acre
(R-12,500)=3.4 units/acre
(R-9,600)=4.5 units/acre
(R-8,400)=5.1 units/acre
(R-7,200)=6 units/acre

(LDMR)=10.8 units/acre
(MR)=21.7 units/acre

Spokane County

(RR-10)=0.1 units/acre
(SRR-5)=0.2 units/acre
(SRR-2)=0.5 units/acre
(SR-1)=1 unit/acre
(SR-1/2)=2 units/acre
(UR-3.5)=3.5 units/acre
(UR-7)=7 units/acre

(UR-12)=12 units/acre
(UR-22)=22 units/acre

Bellevue

(R-2.5)=2.5 units/acre
(R-3.5)=3.5 units/acre
(R-4)=4 units/acre
(R-5)=5 units/acre

(R-10)=10 units/acre
(R-15)=15 units/acre
(R-20)=20 units/acre
(R-30)=30 units/acre

Bremerton

(SF-1)=2.8 units/acre
(SF-2)=4.5 units/acre
(SF-3)=9 units/acre
(CBR)=14.5 units/acre

(DR)=9 units/acre
(HD)=43.5 units/acre
(MF)=21.2 units/acre
(MR)=43.5 units/acre

Everett

(R-S)=3.5 units/acre
(R-S-1)=4.8 units/acre
(R-2)=8.7 units/acre

(R-3(L))=12.1 units/acre
(R-3)=29 units/acre
(R-4)=58 units/acre

Renton

(R-1)=6 units/acre
(R-1-5)=8 units/acre
(R-2)=6 units/acre

(R-2)=12.1 units/acre
(R-3)=25 units/acre
(R-4)=35 units/acre

Seattle (select zones)

(SF9,600)=4.5 units/acre
(SF7,200)=6 units/acre
(SF5,000)=8.7 units/acre
(LDT)=21.7 units/acre
(L1)=27.2 units/acre
(L2)=36.3 units/acre
(L3)=54.4 units/acre
(L4)=72.6 units/acre
(RD5,000)=27.2 units/acre
(RM800)=109 units/acre
(RMH350)=124.5 units/acre
(RMV200)=124.5 units/acre
(RMV150)=145 units/acre
(can be increased to 195 units/acre for low income, elderly housing)

Spokane

(CR-1)=1 unit/acre
(CR-2)=3 units/acre
(RS)=4 units/acre
(R1)=6 units/acre
(R2)=7.3 units/acre
(R2(duplex)=14.5 units/acre
(R3)=21.8 units/acre
(R4)=43.5(less than 4 stories) 145 units/acre (4 or more stories)

Tacoma

(R-1)=6.2 units/acre
(R-2)=8.7 units/acre
(R-2SRD)=14.5 units/acre
(R-3)=14.5 units/acre
(R-4-L)=29 units/acre

Vancouver

(R-1-20)=2.2(4.4)units/acre
(R-1-10)=4.4(8.7)units/acre
(R-1-7.5)=5.8(10.9)units/acre
(R-1-6)=7.3(10.9)units/acre
(R-1-5)=8.7(13.1)units/acre
(R2)=11.6(17.4) units/acre
(R3)=17.4(34.8) units/acre
(R4)=29(54.4) units/acre
(R5)=43.5("unlimited density may be permitted, subject to staff review....")

Note: densities in parenthesis are allowed for a higher quality development without going through the PUD process.

Parking

Parking Requirements for Retail

Minimum spaces per gross building floor area unless otherwise noted.

Jurisdiction	Minimum off-street parking	Ratio: 1 sp. per sq. ft.
Kitsap County		
(heavy auto traffic)	1 space per 150 sq. ft.	1/150
(light auto traffic)	1 space per 300 sq. ft.	1/300
King County	1 space per 200 sq. ft.	1/200
Pierce County	1 space per 200 sq. ft.	1/200
Spokane County	1 space per 200 sq. ft.	1/200
Snohomish County	4.5 spaces per 1000 sq. ft.	1/222
Clark County	1 space per 350 sq. ft.	1/350
Renton	1 space per 200 sq. ft.	1/200
Tacoma	5 spaces per 1000 sq. ft.	1/200
Vancouver	1 space per 200 sq. ft.	1/200
Spokane	1 space per 250 sq. ft. ground floor and 1 space per 400 sq. ft. other floors	1/250-1/400
Bremerton	1 space per 300 sq. ft.	1/300
Bellevue (CBD)	3.3 - 4 spaces min. and 5 spaces max. per 1000 net sq. ft. depending on zone	1/303 - 1/200 net
Bellevue (non-CBD)		
less than 15,000 nsf	1 space per 1000 net sq. ft.	1/1000 net
more than 15,000 nsf.	1.5 spaces per 1000 net sq. ft.	1/667 net
Seattle	1 space per 350 sq. ft.	1/350
Seattle (CBD)	0.4 spaces per 1,000 sq. ft. in areas with "high transit access" Max. in Seattle CBD is 1 space per 1,000 sq. ft.	1/2,500

Parking Requirements for Business and Professional Offices

Minimum spaces per gross building floor are unless otherwise noted.

Jurisdiction	Minimum off-street parking	Ratio: 1 sp. per sq. ft.
King County	1 space per 200 sq. ft.	1/200
Kitsap County	1 space per 300 sq. ft.	1/300
Snohomish County	3 spaces per 1000 sq. ft.	1/333
Spokane County	1 space per 350 sq. ft.	1/350
Clark County	1 space per 400 sq. ft.	1/400
Pierce County	1 space per 400 sq. ft.	1/400
Renton	1 space per 200 sq. ft.	1/200
Tacoma	3.5 spaces per 100 sq. ft.	1/286
Everett (non-CBD)	1 space per 400 sq. ft.	1/400
Everett (CBD)	1 space per 800 sq. ft.	1/800
Vancouver (non CBD)	1 space per 400 sq. ft.	1/400
Vancouver (CBD)	1 space per 1000 sq. ft.	1/1000
Spokane	1 space per 400 sq. ft. ground floor, 1 space per 600 sq. ft. other floors	1/400-1/600

Bellevue (non-CBD)	4 min. and 5 max. per 1000 sq. ft.	1/250-1/200
Bellevue (CBD)	2 - 2.5 spaces min. and 2.7 - 3.0 spaces max per 1000 sq. ft.	1/500-1/333
Bremerton		
(non-c.s.)	1 space per 800 sq. ft.	1/800
(c.s.)	1 space per 400 sq. ft.	1/400
Seattle (non CBD, c.s.)	1 space per 350 sq. ft.	1/350
Seattle (non CBD)	1 space per 1,000 sq. ft.	1/1000
Seattle (CBD)	0.67 spaces per 1,000 sq. ft. in areas with "high transit access"	1/1492

Note: "c.s." = "customer service"

Parking Requirements for Manufacturing

Minimum spaces per gross floor area unless otherwise noted.

Jurisdiction	Minimum off-street parking	Ratio: 1 sp. per sq. ft.
Kitsap County	1 space per 400 sq. ft. and 1 space per 2 employees	1/400+
Spokane County	1 space per 400 sq. ft.	1/400
Clark County	1 space per 500 sq. ft.	1/500
Snohomish County	1 space per 1000 sq. ft.	1/1000
King County	1 space per 1000 sq. ft. or 1 space per 3 employees on largest shift	1/1000
Pierce County	1 space per 3 employees on largest shift	
Everett	1 space per 600 sq. ft.	1/600
Bellevue	1.5 spaces per 1000 net sq. ft.	1/750 net
Bremerton	1 space per 2 employees and not less than 1 space per 800 sq. ft.	1/800
Vancouver	1 space per 800 sq. ft.	1/800
Auburn	1 space per 1000 sq. ft.	1/1000
Renton	1 space per 1000 sq. ft.	1/1000
Spokane	1 space per 1000 sq. ft. or 2 per 3 employees, whichever is greater	1/1000
Tacoma	1 space per 1000 sq. ft. or 1 for each employee	1/1000
Seattle	1 space per 1500 sq. ft.	1/1500
Edmonds	1 space per 2 employees on largest shift	

Site Design: Setbacks

Minimum Front Setbacks for Commercial, Office, and Industrial Zones

Clark County

CR-Rural Commercial	20'
C1-Convenience Commercial	20'
C2-Neighborhood Commercial	20'
C3-Community Commercial	20'
C4 -Regional Commercial	20'
CL-Limited Commercial	20'
CH-Highway Commercial	20'
CF-Freeway Commercial	20'
BP2-Business Park 2	20'
BP-Business Park	35'
MP-Industrial Park	40'
ML-Light Industrial	25'
MH-Heavy Industrial	25'

King County

BN-Neighborhood Business	8'/25' (depend. on abutting arterial or
BRN-Mixed Business-Resid'l.	access street, or freeway)
Neighborhood Scale	1' per 1' of bldg. ht./25'
BC-Community Business	8'/25'
CG-General Commercial	8'/25'
ML-Light Manufacturing	8'/25'
MP-Manufacturing Park	25'
MH-Heavy Manufacturing	8'/25'

Kitsap County

BN-Business Neighborhood:	20'
BC-Business Convenience:	20'
BG-Business General:	20'
BT-Business Trade:	20'
LM-Light Manufacturing	50'
M-Manufacturing	20'

Pierce County

RMH-Residential Multi-family/ Office	35'/25' (depend. on abutting highway-arterial or local street or road)
PBO-Professional Business-Office	35'/25'
C-1-Neighborhood Commercial	35'/25'
C-2-Community Commercial	35'/25'
C-3-General Commercial	35'/25'
C-4 -Regional Commercial	35'/25'
M-1-Light Manufacturing	35'/25'
M-2-Heavy Manufacturing	35'/25'

Snohomish County

NB-Neighborhood Business	25'
PCB-Planned Community. Bus.	40'
CB-Community Business	25'
GC-General Commercial	25'
IP-Industrial Park	30'
BP-Business Park	30'
LI-Light Industrial	25'
HI-Heavy Industrial	25'

Spokane County

B-1-Neighborhood Business	35'
B-2-Community Business	35'
B-3-Regional Business	35'
I-1-Industrial Park	100' (adjacent to a highway, major or secondary arterial) 50' (adjacent to typical public street)
I-2-Light Industrial	35'
I-3-Heavy Industrial	35'

Bellevue

PO Professional Office	30'
O Office	30'
OLB Office/Limited Business	50'
LI Light Industry	15'
GC General Commercial	15'
NB Neighborhood Business	30'
CB Community Business	15'
CBD-OLB	50'
all CBD zones	0'

Bremerton

PO-Professional Office:	20'
MR-Mixed Residential	20'
NB-Neighborhood Business:	10'
GB-General Business:	20'
BC-Business Core	0'
IP-Industrial Park	20'
IG-General Industry	20'

Everett

B-1-Neighborhood Business	
B-2-Community Shopping	10'
B-2(B)-Office	10'
C-1-General Commercial	10'
C-1R-Regional Commercial/Office	0'
C-2-Heavy Comm/Light Indus.	10'
B-3-Central Business	0'

M1-Office and Indus. Park	30'
M2-Heavy Manuf'g.	20'
MM-Business Park	20'

Renton

B-1-Business	10'-30' (depends on bldg. ht.)
O-P-Office Park	60' (or 20% of lot depth)
M-P-Manufacturing Park	60'
L-I-Light Industrial	20'
H-1-Heavy Industry	20'

"All buildings abutting or fronting on a freeway or major or secondary arterial shall maintain a ten foot landscaped setback from the street property line or a twenty foot landscaped setback from the back of the sidewalk, whichever is less."

Seattle

(varies for all uses in all zones, based on height of structures and adjacent zones)

Spokane

RO-Residence Office	15'
B1-Local Business	15'
B2-Community Business	0' (15' with ground-floor residential)
B3-Central Business	0'
C-Commercial	0'
M1-Light Industrial	0'
M2-Heavy Industrial	0'
M3-Unrestricted Industrial	0'

Tacoma

B-Business	0'
M-I-Light Industrial	0'
M-Z-Heavy Industrial	0'
M-3-Heavy Industrial	0'
PDB-Planned Business Development	25'
PDI-Planned Industrial Development	25'

Vancouver

NC-Neighborhood Commercial	10'
CC-Community Commercial	10'
HC-Highway Commercial	25'
RC-Regional Commercial	20'
DC-Downtown Commercial	0'
ML-Light Industrial	(setbacks for industrial zones are
MH-Heavy Industrial	based on surrounding zones)
MC-Industrial/Commercial	

Maximum Employment Densities for Zones Allowing Offices and Manufacturing

Note: Where FARs are not given in the code, the "Est. FAR" (Estimated FAR) is based on maximum lot coverages, and 10' floor heights for office occupancies and 15' floor heights for industrial occupancies. Where setbacks and maximum heights are specified, the maximum height is given.

Clark County:	C3	40%	MP	50%
(FARs and max	C4	40%	ML	60%
heights not given)	CL	40%	MH	60%
	CH	40%		
	BP Est. FAR =1.5			

King County:	BN FAR=1	ML FAR=2.5
(given as FAR)	BC FAR=3	MP FAR=2.5
	GC FAR=3.5	MH FAR=2.5

Kitsap County:	BN max. ht. = 30'	LM max. ht.=30'
(FARs and max.	BC max. ht. = 30'	M max. ht. =30'
lot coverage	BG max. ht. = 65'	
not given)	BT max. ht. = 65'	

Pierce County:	C1 max. ht. = 35'	MI max. ht. = 45'
(FARs and max.	C2 max. ht. = 45'	M2 max. ht. = 45'
lot coverage	C3 max. ht. = 45'	
not given)	C4 max. ht. = 65'	
	PBO max. ht. = 35'	
	RMH max. ht. = 45'	

Snohomish County:	NB Est. FAR= 1	LI max. ht. = 50'
(FARs not given,	CB Est. FAR=1.5	HI max. ht. = 65'
based on max. lot	GC Est. FAR=2	
coverage and max. heights)		

Spokane County:	B-1 Est. FAR=1.5	I-1 Est. FAR=1.3
(FARs not given,	B-2 Est. FAR=2.7	I-2 Est. FAR=1.3
based on max. lot	B-3 Est. FAR=3.6	I-3 Est. FAR=2.6
coverage and max. heights)		

Bellevue: (given as FAR for CBD, for non-CBD, values are based on max. lot coverage and max. ht.)	CBD-0-1 FAR	5	8 (max non.res.; no max. with res.)	
	CBD-0-2 FAR	4	6 ("	6 with max.res.)
	CBD-MU FAR	0.5	3 ("	5 ")
	CBD-R FAR	0.5	1 ("	5 ")
	CBD-OB FAR	0.5	1 ("	5 ")
	CBD-OLB FAR	0.5	3 ("	N/A ")
	O Est. FAR=1	LI Est. FAR=1.5		
	PO Est. FAR=7	NB Est. FAR=0.7		
Bremerton: (FARs not given, based on max. lot cov. and max. ht.)	PO Est. FAR=1.35	BP Est. FAR =1.5		
	NB Est. FAR=1.5	IP Est. FAR =1.5		
	GB Est. FAR=6	IG Est. FAR =8		
	MX Est. FAR=1.35	PS Est. FAR=1		
	BC Est. FAR=12			
Everett: (FAR given for B-3 only)	B-3 FAR=3	M-1 Est. FAR=1.6		
	B-1 max. ht.=35'			
	B-2 max. ht.=35'	M-2 max. ht.=80'		
	B-2(B) max. ht.=28'	MM max. ht.=65'		
	C-1 max. ht.=50'	C-2 max. ht.=65'		
	C-1-R max. ht.=35'			
Renton: (FARs not given: values are based on max. lot coverage and max. ht.)	B-1 Est. FAR=5.8 (95' max ht. & 65% max. lot cov.)	LI Est. FAR=3.25 (50' max. ht. & 65% max. lot. cov.)		

Seattle:
(given as F.A.R. select zones only)

DOC1 FAR	5	7	10	14 (depending on public benefit features and housing bonuses)
DOC2 FAR	4	6	8	10 "
DRC FAR	2.5	3.5	4	6 "
DMC FAR	4	6	7	(depending on features, etc.)
DMR FAR	1	2	2	
IG1 FAR	1 (Office or Retail) and 2.5 (Industrial)			
IG2 FAR	2.5			
IC FAR	2.5			
IB FAR	2.5			

Commercial Zones NC1, NC2, NC3, C1, and C2 : FARs vary from 4.5 to 5 to 6 to 7 based on height established within zone, and use of structure. In all cases a mixed use structure is allowed the highest FAR.

Spokane:	RO Est. FAR=7.5	M1 FAR=10
(FARs given for	B1 Est. FAR =5	M2 FAR=10
downtown and indus.	B2 FAR=1	M3 FAR=10
zones only)	B2D FAR=4.5	
	B3 FAR=13	
	C FAR=10	
Tacoma:	B FAR=15	
(FAR given for B		
zone only, max. lot	PDI max. ht. =60'	M-I max. ht. =75'
cov's not given)	CPN max. ht. =35'	M-Z max. ht. =100'
	CPC max. ht. =45'	M-3 max. ht. =100'
	CPR max. ht. =75'	
	C-1 max. ht. =45'	
	C-2 max. ht. =45'	
	MC max. ht. =120'	
Vancouver:	CC Est. FAR=2.5	ML Est. FAR=1.8
(FARs not given)	HC=40%	MH=100%
	RC=40%	MC Est. FAR=1.8
	DC (varies throughout CBD)	

(greater heights are allowed in ML and MC zones with increased setbacks)

An Overview of Zones Allowing and/or Encouraging Mixed Use Developments

Clark County

AO-15,AO-18,AO-22,AO-30, and AO-43: Apartment Office Districts."
These districts are intended to provide for multiple-family residential and professional office development based upon consistency with the Comprehensive Plan and compatibility with surrounding land uses. It is intended that office developments within these districts will be of a higher standard in recognition of their residential setting."

Permitted Residential Uses: Multiple-family dwellings and single family dwellings permitted by review of planning director. (All AO zones)
Permitted Commercial Uses: Limited to restaurants within residential or office complexes, in AO-30 and AO-43 zones only. Same uses permitted in other AO zones by Conditional Use permit.
Permitted Office Uses: Business, professional, medical and dental offices permitted in all AO zones.

King County

BR-N Mixed Business-Residential, Neighborhood Business
"Provides for the location of mixed commercial (i.e. retail and office) and residential use projects, for increased diversity in opportunities for desirable housing, and increased vitality of neighborhood business areas."

Permitted Residential Uses: Multiple dwelling units, accessory residential uses, and retirement homes.
Permitted Commercial Uses: Retail food sales, business, professional, and personal service offices

BR-C Mixed Business-Residential, Community Scale
"Provides for the location of mixed commercial (i.e. retail and office) and residential use projects, for increased diversity in opportunities for desirable housing, and increased vitality of community business areas."

Permitted Residential Uses: Multiple dwelling units, accessory residential uses, retirement homes, and day nurseries."
Permitted Commercial Uses: Any use permitted in the Br-N zone, entertainment and recreation enterprises excluding gambling and adult theatres, and public office buildings, art galleries, museums and libraries."

Dwelling units are not permitted in the BN, BC, or GC zones.

Kitsap County

BN Business Neighborhood
"The intent of the business neighborhood zone is to provide commercial and professional services in neighborhood settings for the convenience commercial needs found in Rural areas,

compact neighborhoods and community centers where more permissive zoning is not appropriate."

Permitted Residential Uses: Single family dwellings, attached to a retail or personal service use

Permitted Commercial Uses: Small-scale retail and personal service establishments

BC Business Convenience
"The intent of the business convenience zone is to provide commercial and professional services in neighborhood settings for the convenience needs of the nearby residents rather than the larger community."

Permitted Residential Uses: Single family dwellings, duplexes, multi-family dwellings, and mobile homes.

Permitted Commercial Uses: Retail, personal and professional establishments intended to serve the needs of surrounding communities and the traveling public.

BG Business General
"The intent of the Business General zone is to provide for the retail, personal, professional and recreational needs and desires of its surrounding communities and the region."

Permitted residential and commercial uses include all uses permitted in the BC zone, and retail, personal, professional and recreational uses any of which may be large scale.

Pierce County

"Section 18.88.090 Mixed Use Developments:"
"Mixed use developments are permitted in the F, G, SA, C3, M1, and M2 zones. A mixed use development is a substantial, planned development comprised of a full spectrum of land uses carefully planned to maintain compatibility and value of uses and property within and outside the confines of the development. A mixed use development may include residential, commercial, and industrial uses and activities."

1. Mixed use developments shall require a Special Conditional Use Permit
2. Mixed use developments shall be allowed only on sites of 80 acres or larger.

(6 conditions are noted)

Snohomish County

There are not any specific provisions for mixed use zones in the zoning code, nor are their any incentives to include a mixture of uses within buildings or within zones. However multiple family dwelling units are permitted in the LDMR, MR, NB, PCB, CB, and GC zones. Single family dwellings are permitted in all zones except FS, IP, BP, LI, and HI zones.

General offices are permitted in the NB, PCB, CB, GC, IP, BP, LI, and HI zones. General retail stores are permitted only in the NB, PCB, CB, GC, BP, LI, and HI zones.

Spokane County

There are not any zones established specifically to encourage mixed-use developments.

"General commercial uses" are prohibited in zones SRR-5, SRR-2, SRR-1, SRR-1/2, UR-3.5, UR-7, UR-12, and UR-22.

Professional offices are permitted in zones UR-12 and UR-22. Medical offices are permitted in zone UR-22.

Dwelling units are allowed, only in upper floors of a commercial or business building, in zones B-1, B-2, and B-3.

Professional offices are permitted in the I-1 zone, but not in the I-2 zone. Restaurants are allowed in the I-1 zone, but not in the I-2 and I-3 zones.

Bellevue

CBD-MU Central Business District, Mixed Use
"The purpose of the CBD-MU district is to provide an area for a wide variety of retail activity, low intensity offices, BCD support services, and residential uses. Multiple uses are encouraged on individual sites, and in individual buildings, as well as broadly in the district as a whole."

Residential development is encouraged in the Bellevue CBD zones by allowing large increases in the allowable F.A.R. if residential units are included.

Of all the codes within this study, the Bellevue code has the most concise chart for determining permitted uses in various zones.

Bremerton

MX Mixed Use (zone description not given)
The MX zone does not allow a detached single-family dwellings, it allows an attached single family dwelling through a Planned Unit Development, it allows a multiple-family dwelling (less than 4 units), and it allows a multiple-family dwelling (more than 4 units) with a Special Use Permit. Residential units over commercial are allowed with a special use permit.

MR Mixed Residential
The MR zone does not allow detached single-family dwellings, it allows an attached single-family dwelling through a Planned Unit Development, it allows a multiple-family dwelling(less than 4 units), it allows a multiple-family dwelling (more than 4 units) through a Planned Unit Development, and it allows residential over commercial through a Special Use Permit.

Residential over commercial is allowed in the CBR Central Bremerton Residential District, the HD Highline District, and residential over commercial is allowed in the MR, PO Professional Office, NB Neighborhood Business, GB General Business, BC Business Core, and the MX zone.

Everett

Residential uses are permitted in the B-1 Neighborhood Business and and B-2 Community Shopping zones only as an accessory to another permitted use. Multi-family dwellings are permitted in the B-2(B) zone only as a part of a mixed use development in which at least 25% of the gross floor area is a permitted use. Multi-family dwellings are permitted in the B-3 Central Business and W-C Waterfront Commercial Districts. One of the purposes of the B-3 zone is stated as, "Provide a multi-use character of retail, service, financial, office, governmental, residential, human service, and cultural activities."

Everett also has defined several Overlay zones which allow for clinic and offices in the R-3, R-4, and R-5 zones.

Offices are permitted in the M-2 zone.

Renton

B-1 Business District
Permitted Residential Uses: Residential units are permitted when located in a mixed use building of commercial and residential uses. No residential uses are allowed on the first floor."

Residential uses are prohibited from the P-1 Public zone and the O-P Office Park zone.

Retail uses are prohibited from the R-1, R-1-5, R-2, R-3, and R-4 zones.
Retail sales are permitted in the O-P zone only when incidental to a permitted use. Retail and office uses are permitted in the L-1 Light Industry zone only when incidental to a permitted use.

Seattle

RM-MD Multiple Residence Mixed Density
"The RM-MD zone provides for variable density housing including tower apartment houses where such buildings have a desirable relationship with surrounding structures, and certain nonresidential uses compatible with housing and with adjacent commercial areas, located in close proximity to the City center or other major subcenters and employment areas, and having access to adequate transportation facilities and other amenity features."

DMC Downtown Mixed Commercial
All uses are permitted outright in the DMC zones except drive-in businesses (except gas stations located in parking garages), outdoor storage, adult theaters, all general and heavy manufacturing uses, all salvage and recycling uses, and all high high-impact uses.

DMR Downtown Mixed Residential
All uses are permitted outright in the DMR zones except drive-in businesses (except gas stations located in parking garages), outdoor storage, helistops and heliports, adult theaters, light manufacturing uses, all general and heavy manufacturing uses, all salvage and recycling uses, all high impact uses, and work-release centers.

Various uses are permitted in different zones. The two attached charts illustrate allowable residential uses in commercial zones. (See attached)

Spokane

RO Residence-Office Zone
"The RO zone is intended to accommodate relatively unobtrusive business and institutional uses of a type and in locations where they blend into medium-density or high-density residential areas. There are two categories within the RO zone classification: Category I, designated as RO-1 being for less intensive business uses and Category II designated RO being less restrictive."

Permitted Residential Uses: (RO-1) All permitted in the R3 zone.

Permitted Commercial Uses: (RO-1) Business and professional offices.

Tacoma

MC Mixed Commercial District
"The intent of the mixed commercial district is to govern the use and development of property surrounding downtown Tacoma by providing an appropriate and congruous transition between the high intensity Central Business District and its surrounding areas. Much of the area surrounding the Tacoma CBD has been developed for many years, making it difficult to rehabilitate and reuse the existing buildings.....The establishment of a Mixed Commercial District would promote physical and economic revitalization, encourage greater occupancy and increased use of land and existing buildings, and achieve a greater variety of urban functions including light manufacturing, commercial service, wholesale, retail and other uses compatible with downtown Tacoma."

Permitted uses in the MC zone include those permitted in the B Business district.

Single and multi-family dwellings are permitted in the B, C-1, C-2, C-3, and M-I zones.

T Residential-Commercial Transitional
"This district is designed primarily for office and institutional land uses which may be carried on with no offensive noise, smoke, odors, fumes, or other objectionable conditions,..."

Permitted uses in the T zones include professional, business, and medical offices. Extensive retail shops are not permitted.

Retail uses are not allowed in the R-1, R-2, R-3, R-4, and R-5 zones.

Vancouver

There are not any zones established specifically to encourage mixed-use development.

Retail uses up to 5,000 sq. ft. in planned developments of 150 units or more are allowed as a Permitted Use in zones R-1-5, R-1-6, R-1-7.5, R-1-10, R-1-20, R-2, R-3, R-4, and R-5.

Multiple-family dwellings are allowed as follows: in the CC, DC and HC zones as a Permitted use; in the RC as a Conditional Use.

Density Bonus Systems in PUD Process Example: King County

Planned Unit Development

Residential planned unit developments may locate only in FR, RS, RD, RM, SE, and SR zones. In a residential PUD, the following uses are permitted: dwellings; one family, two-family, or multiple-family. Accessory incidental retail and other nonresidential uses are permitted if "integrated into the project by design and if designed and scaled to serve only as a convenience to the inhabitants of the project." Retail uses are permitted only when two bonus units per acre are earned through the bonus system. (the bonus system is outlined below) PUDs for other than residential uses may locate only in zones first permitting the heaviest use locating on the premises. In non residential PUDs, uses shall be limited to those permitted in the underlying zone.

Base unit per acre densities for each zone are as follows:

Se and F	1 unit/acre	RD 3600:	8 units/acre
RS 15000:	2.8 units/per acre	RM 2400:	12 units/acre
RS 9600:	3.8 units/acre	RM 1800:	16 units/acre
RS 7200:	4.4 units/acre	RM 900:	16 units/acre
SR:	same as zone		

Bonus units per acre may be cumulatively earned by 23 provisions which include the following:

"Fifteen one-hundredth unit per acre bonus if public transit is available within walking distance (approximately one-half mile) and the service is provided twice hourly during morning and evening peak hours."

"Fifteen one-hundredths unit per acre bonus if offsite convenience shopping facilities are functionally accessible within reasonable walking distance (approximately one-half mile).
"Fifteen one-hundredths per acre bonus if the development features a mix of housing types. Single residences, attached single units from duplexes to townhouses and apartments are examples of housing types. The mix need not include some of every type."

"Two-tenths units per acre bonus if the development features a broad range of unit rentals, including at least ten percent at or below ninety percent of the 'Fair Market Rent Levels for New Construction or Substantial Rehabilitation' for the Seattle standard metropolitan statistical area, as determined by the United States Department of Housing and Urban Development Region 10, pursuant to Section 8, Title II, Housing and Community Development Act of 1974. The rental rate for a unit to be sold shall be considered to be one-hundred-twenty percent of the monthly amount necessary to amortize a full twenty-year mortgage on the unit at current interest rates in King County. This subsection shall not be construed as intended to control rents."

These and other bonuses (23 total) are then accumulated, and multiplied by the following "bonus multipliers" to determine the additional increase in density beyond the base densities described above:

SE and FR:	0.1	RD 3600:	2.5
RS 15000:	0.2	RM 2400:	4.0
RS 9600:	0.3	RM 1800:	5.0
RS 7200:	1.0	RM 900:	8.0
SR:	same as zone		

Also within PUDs, pedestrian circulation facilities are required, and such facilities shall be "functionally and safely convenient to schools and to commercial, recreational and utility areas within or adjacent to the project, or functionally convenient to a larger pedestrian circulation system which serves that same purpose."

Zoning Code Summaries

Clark County

RR Rural Residential

RS Suburban Residential

R1-7.5, R1-10, and R1-20 Single-Family Residential

R1-6 and R4 Single-Family/Duplex Residential

A2 and A3 Apartment Residential

A1 Apartment Residential

AR-10, AR-12, AR-15, AR-18, and AR-22 Apartment Residential

AO-15, AO-18, AO-22, AO-30, and AO-43 Apartment Office
15, 18, 22, 30, and 43 units/acre
"These districts are intended to provide for multiple-family residential and professional office development based upon consistency with the Comprehensive Plan and compatibility with surrounding land uses. It is intended that office developments within these districts will be of higher standard in recognition of their residential setting."

CR Rural Commercial
"These commercial centers are intended to provide for the location of small businesses and services in rural areas for the convenience of rural residents."

C1 Convenience Commercial
"These commercial centers are intended to provide services for frequent needs of the residents of the immediate urban neighborhood in which they are found."

C2 Neighborhood Commercial
"These commercial centers are intended to provide for medium-sized shopping and service facilities. They are intended to provide for the shopping and service needs of the immediate urban area in which they are found."

C3 Community Commercial
"These commercial centers are intended to provide for the shopping and service needs for large sections of the County."

C4 Regional Commercial
"These commercial centers are intended to provide for the shopping and service needs of the region."

CL Limited Commercial
"This district is intended to recognize existing retail and service commercial development patterns that occur as small centers or strips."

CH Highway Commercial
"This district is intended to recognize the existing commercial development pattern of some areas in the County."

CF Freeway Commercial
"This district is intended to be applied within areas which have convenient access or are adjacent to the freeway interchanges in the County."

BP Business Park
"The Business Park District provides for areas not less than 7 acres of high development and operational standards fore limited light manufacturing and wholesale trade, light warehousing, business and professional services, research, business, and corporate offices and other similar compatible or supporting enterprises not oriented to the general public in a park-like setting."

BP2 Business Park2
"The purpose of the Business Park2 District is intended to provide for integrated grouping of small to medium size businesses within an attractive, park-like setting.

MP Industrial Park

King County

RS Residential Single Family

SE Suburban Estate Classification

SC Suburban Cluster

SR Suburban Residential

G General
"Regulates the use of land in areas generally undeveloped and not yet subjected to urban development pressures to prevent the improper location and intrusion of business and industrial uses."

GR Growth Reserve
"Provides for limited residential growth adjoining existing supporting public facilities but reserves large tracts of open land for possible future urban or suburban growth."

RM 900 Maximum Density Multiple-Dwelling Restricted Service Classification
"Establishes areas permitting the maximum population density and also permits certain uses other than residential, e.g. medical, dental, social services and certain professional offices."

G-5 General: Five Acres
"Provides for an area-wide rural character and prevents premature urban development in areas without adequate urban services."

RT Residential, Townhouse

RD 3600 Two Family Dwelling Classification

RM 2400 Medium Density Multiple-Dwelling Classification

RM 1800 High Density Multiple-Dwelling Classification

BN Neighborhood Business Classification
"Provides for shopping and limited personal service facilities to serve the everyday needs of the neighborhood. Dwelling units are excluded from this classification."

BR-N Mixed Business - Residential Use, Neighborhood Scale
"Provides for the location of mixed commercial (i.e. retail and office) and residential use projects, for increased diversity in opportunities for desirable housing, and increased vitality of neighborhood business areas."

BC Community Business Classification
"Provides for the grouping of similar type enterprises including recreation, entertainment and general business activities, but excluding uses relying on outdoor sales. It is a further objective to concentrate a maximum variety of facilities as a contribution to the convenience of shoppers and patrons on a community-wide basis. Dwelling units are excluded from this classification.

BR-C Mixed Business - Residential Use, Community Scale
"Provides for the location of mixed commercial (i.e. retail and office) and residential use projects, for increased diversity in opportunities for desirable housing, and increased vitality of community business areas."

CG General Commercial Classification
"Provides for the grouping of enterprises which may involve some on-premise retail service but comprised primarily of those with outside activities and display or fabrication; assembling including manufacturing and processing in limited degree. These uses, if permitted to locate in strictly on-premise retail and service areas, would introduce factors of heavy trucking and handling of materials that destroy the maximum service and attraction of strictly retail areas. With the exception of trailer parks, dwelling units are not permitted."

ML Light Manufacturing Classification
"Provides for the heavier general commercial uses and for industrial activities and uses involving the processing, handling and creating of products, research and technological processes as distinguished from major fabrication. These uses are largely devoid of nuisance factors, hazard or exceptional demands upon public facilities and services."

MP Manufacturing Park Classification
"Provides for industrial areas of high standards of operational development and environment. Standards of intensity of use and standards of external effects which will minimize traffic congestion, noise, glare, air and water pollution, fire and safety hazards are established in this classification."

MH Heavy Manufacturing Classification
"Provides for industrial enterprises involving heavy manufacturing, assembling, fabrication and processing, bulk handling of products, large amounts of storage, warehousing and heavy trucking."

Kitsap County

Ru-2.5 AC Rural 2.5 acre

Ru-1 AC Rural 1 acre

Ru-1 AC WF Rural 1 acre waterfront

R-2 Residential R-2

R-2 WF Residential R-2 Waterfront

R-2 MH

R-3 Residential R-3

R-3 MH

R-4 Residential R-4

R-5 Residential R-5

R-5 MH Residential R-5 Mobile Home

R-6 Residential R-6

R-9 Residential R-9

R-12 Residential R-12

R-18 Residential R-18

R-24 Residential R-24

R-30 Residential R-30

BN Business Neighborhood
The intent of the business neighborhood zone is to provide commercial and professional services in neighborhood settings for the convenience commercial needs found in Rural areas, compact neighborhoods and community centers where more permissive zoning is not appropriate."

BC Business Commercial
"The intent of the business convenience zone is to provide commercial and professional services in neighborhood services in neighborhood settings

BG Business General
"The intent of the business general zone is to provide for the retail, personal, professional and recreational needs of its surrounding communities and the region."

BT Business Trade

"The intent of the business trade zone is to permit the most intense sort of retail, commercial and wholesale uses together with limited amounts of light, clean manufacturing and assembly of products."

LM Light Manufacturing

M Manufacturing

Pierce County

G-35, G-80, and G-160 General Use

RR-15, RR-35, RR-80, and RR-160 Rural Residential

WR-12.5, WR-15, and WR-35 Waterfront Residential

SA-12.5, SA-15, and SA-35 Suburban Agriculture

SR-12.5, SR-15, SR-20, and SR-30 Suburban Residential

RA -35 Residential Acreage

RE-7.2, RE-9, and RE-12.5 Residential Estates

RD-4.8, RD-6, RD-7.2, and RD-9 Residential Duplex

RT-4.8 and RT-6 Residential Townhouse

RM-2.4 and RM-3.6 Residential Multi-family

RMH Residential Multi-family High Density/Office
The purpose of the RMH zone is to establish an appropriate zone which will provide for apartment or condominium structures at a high density, and will allow certain service, research, office, and education uses and activities, but will not include retail or manufacturing uses."

PBO Professional-Business Office
The purpose of the Professional Business and Office classification is to establish, "an appropriate zone which will provide for the location of office park developments, and other service, office, research, education, and business uses and activities."

C-1 Neighborhood Commercial
The purpose of the Neighborhood Commercial classification is to establish, "an appropriate zone which will provide for the location of retail trade and service activities at a scale to serve the convenience and needs of the surrounding residential area, to promote vehicular energy conservation and retain the residential character."

C-2 Community Commercial
The purpose of the Community Commercial classification is to establish, "an appropriate zone which will provide for the location of commercial centers which will meet the needs of a community for a wide variety of trade, recreation, transportation services, eating and drinking

places, personal services, business services, educational services,,, health services, and cultural amenities. These uses and activities are intended to match an intensity of development needed to serve the community market areas as contrasted with neighborhood and regional service areas."

C-3 General Commercial
The purpose of the General Commercial classification is to establish, "an appropriate zone which will provide for the location of business developments and other commercial enterprises including wholesale and limited manufacturing or processing uses within both commercial center and existing strip commercial locations."

C-4 Regional Commercial
The purpose of the Regional Commercial classification is to establish an appropriate zone which will provide for the location of commercial centers intended to allow uses and activities to serve the needs of the regional service area."

C-5 Rural Commercial
The purpose of the Rural Commercial classification is to establish a zone which will provide locations for shopping, personal service, and business service uses convenient to rural residents..."

M-1 Light Manufacturing
The purpose of the Light Manufacturing classification is to establish a zone which will provide for the location of light manufacturing park developments and limited types of industrial uses and activities involving the research, development, processing, handling, or creating of products. Residential, institutional, and all commercial uses except those which serve the needs and convenience of such industries are not permitted."

M-2 Heavy Manufacturing
The purpose of the Heavy Manufacturing classification is to establish a zone which will provide for the location of industrial uses and activities involving manufacturing, assembling, fabrication and processing, bulk handling of products, storage, warehousing or heavy trucking. Residential, institutional, and commercial uses except those which serve the needs and convenience of industries are not permitted ."

Snohomish County

R-20,000 Residential

R-12,500 Residential

R-9,600 Residential

R-8,400 Residential

R-7,200 Residential

WFB Waterfront Beach

T Townhouse

LDMR Low Density Multiple Residential

MR Multiple Residential

FS Freeway Service
"The intent and function of the freeway service zone is to permit the location of needed freeway commercial facilities in the vicinity of on/off ramp frontages and access roads of limited access highways with a minimum of traffic congestion in the vicinity of the ramp."

NB Neighborhood Business
"The intent and function of the neighborhood business zone is to provide for the location and grouping of uses to a type designed to dispense commodities, provide professional services or personal services. These uses are intended to be small in nature, providing local facilities to serve the everyday needs of the surrounding neighborhood rather than the larger surrounding community."

PCB Planned Community Business
"The intent and function of the planned community business zone is to permit community business enterprises in areas desirable for business but having highly sensitive elements of vehicular circulation, land use or natural site and environmental conditions while minimizing impacts upon these elements through the establishment of performance criteria.'

CB Community Business
"The intent and function of the community business zone is to promote, provide for and protect certain areas for businesses and services designed to serve the needs of several neighborhoods."

GC General Commercial
"The intent and function of the general commercial zone is to permit a wide variety of non-retail commercial and business uses which are primarily related to automotive rather than pedestrian buying."

IP Industrial Park
"The intent and function of the industrial park zone is to provide for heavy and light industrial development under controls to protect the higher uses of land and to stabilize property values primarily in those areas in close proximity to residential or other less intensive development. The IP is designed to insure compatibility between industrial uses in industrial centers for both existing and potential users and the surrounding community."

BP Business Park
"The intent and function of the business park zone is to provide for those business/industrial uses of a professional office, wholesale, and manufacturing nature which are capable of being constructed, maintained and operated in a manner uniquely designed to be compatible with adjoining residential, retail commercial or other less intensive land uses, existing or planned."

LI Light Industrial
"The intent and function of the light industrial zone is to promote, provide for and protect areas for light industrial while at the same time making the areas compatible with ad adjacent nonindustrial areas."

HI Heavy Industrial
"The intent and function of the heavy industrial zone is to promote, provide for and protect areas for heavy industry while at the same time making the areas compatible with adjacent nonindustrial areas."

Spokane County

SR-1 Suburban Residential

SR-1/2 Suburban Residential

UR-3.5 Urban Residential

UR-7 Urban Residential

UR-12 Urban Residential

R-1(A) Single Family Attached, Low Density Residential

R-2 Single Family Medium Density Residential

R-2(A) Single Family Attached, Medium Density Residential

R-3(L) Multiple Family Low Density

R-3 Multiple Family Medium Density

R-4 Multiple Family High Density

R-5 Core Residential
"The primary purpose of the Core Residential Zone is to provide high density residential opportunities in close proximity to the downtown core. The secondary purpose of this zone is to allow for clinics and offices in areas designated by the Everett General Plan and to encourage mixed use residential, office, and neighborhood services in high density neighborhoods near Everett's downtown core."

B-1 Neighborhood Business
"The purpose of the neighborhood shopping zone is to provide for the day-to-day retail, personal service and convenience consumer needs of the immediately adjacent residential neighborhoods, rather than the larger community."

B-2 Community Business
The purpose of the Community Business zone is to provide for retail businesses and services designed to serve the needs of several neighborhoods and allow for businesses which are oriented to arterial streets.

B-2(B) Office
The purpose of the Office zone is to provide for a variety of office uses and office park development, which are constructed, maintained and operated in a manner designed to be compatible with adjoining residential neighborhoods and other less intensive land uses, and to allow certain community service uses and limited multiple family residential.

C-1 General Commercial

C-1R Regional Commercial - Office
"The purpose of the Regional Commercial-Office zone is to provide areas for large scale retail businesses oriented to a regional consumer market, high quality office park development, and related consumer and business services."

B-3 Central Business District
"The purpose of the Central Business District is to provide a strong central urban focus and identity for the city; to provide a multi-use character of retail, service, financial, office, governmental, residential, human service, and cultural activities; and to encourage a pedestrian oriented environment."

C-2 Heavy Commercial/Light Industrial
"The purpose of the "Commercial/Light Industrial" zone is to provide areas for heavy commercial services and a wide variety of manufacturing activities and to promote an upgrading of the quality of development of properties along arterial streets."

M-1 Office and Industrial Park
"The purpose of the Office Industrial zone is to provide for and protect areas for high quality campus style office and industrial park development on large parcels of land."

M-2 Heavy Manufacturing
"The purpose of the Heavy Manufacturing zone is to provide for and protect certain areas of the City for heavy manufacturing uses."

M-M Business Park
"The purpose of the "Business Park" zone is to provide areas for development of high quality, single or multiple tenant, campus style business parks which offer opportunities for a wide variety of non-retail business to locate in small to medium size office and warehouse spaces."

C Clinic and Medical Related Activities Overlay Zone
The purpose of the clinic and medical related activities overlay zone is to provide the opportunity for intensive use of R-3, R-4, and R-5 zoned areas for medical services in areas where such uses have already been established and where such uses are provided for by the Everett General Plan."

O Office Overlay Zone
The purpose of the Office Overlay zone is to provide for a limited range of activities in R-4 and R-5 zoned areas where such uses have already been established and where such uses are provided for by the Everett General Plan."

CO Clinic and Office Overlay Zone
The purpose of the clinic and office overlay zone is to provide for clinics, medical related activities, and office uses in R-4 and R-5 zoned areas where such uses have already been established and where such uses are provided for by the Everett General Plan."

PD Planned Development Overlay Zone
The purpose of the Planned Development (PD) overlay zone is to allow for commercial, industrial and mixed use developments which are of a unique character and desirable quality, and which are beneficial to the area in which the property is located and to the community in general. The planned development overlay zone may only be applied to commercial or industrial zones.

Bellevue

Note: Zone descriptions are included for select zones only.

G General
"General Districts are applied to outlying rural and undeveloped areas, unsuitable for long-term agricultural uses and lacking urban services, in order to maintain the low intensity character and uses until transition to suburban or urban land uses is found to be in accordance with the City's Comprehensive Plan."

R-1 and R- 1.8 Residential Estate

R-2.5 R-3.5, R-4, and R-5 Suburban Residential

R-10, R-15, R-20, and R-30 Urban Residential

PO Professional Office

O Office

OLB Office & Limited Business

LI Light Industrial

GC General Commercial

NB Neighborhood Business

CB Community Business

Central Business District Zones

CBD-0-1 CBD Office District 1
"The purpose of the CBD-0-1 Land Use District is to provide an area for the most intensive business, financial, specialized retail, hotel, entertainment, and urban residential activities. The District is limited in extent in order to provide the level of intensity needed to encourage and facilitate a significant level of transit service. Pedestrian attracting and nighttime activities are encouraged. Transit and pedestrian facilities linking them are encouraged; long-term parking and other automobile oriented uses are discouraged."

CBD-0-2 CBD Office District 2

CBD-MU CBD Multi Use

CBD-R CBD Residential

CBD-OB CBD Old Bellevue

CBD-OLB Office and Limited Business
"The purpose of the CBD-OLB Land Use District is to provide an area for the location of integrated complexes made up of offices, and hotels or motels, with eating establishments and retail sales secondary to these primary uses. The District abuts and has convenient access to the I-405 Freeway."

Bremerton

Summary of Code: Does not include zone descriptions

SF-1, SF-2, and SF-3 Single-family Residential

CBR Central Bremerton Residential

HD Highland District

DR Duplex Residential

MF Multi-family Residential

MR Mixed Residential

PO Professional Office

NB Neighborhood Business

GB General Business

SC Shopping Center

BC Business Core

IF Industrial Park

IG General Industry

MX Mixed Use

LPO Limited Parking Overlay

Everett

Note: Zone descriptions are included for select zones only.

R-S Suburban Residential

R-S-1 Smaller Lot Suburban Residential

R-1 Single Family Detached, Low Density Residential

R-1(A) Single Family Attached, Low Density Residential

R-2 Single Family Medium Density Residential

R-2(A) Single Family Attached, Medium Density Residential

R-3(L) Multiple Family Low Density

R-3 Multiple Family Medium Density

R-4 Multiple Family High Density

R-5 Core Residential

B-1 Neighborhood Business

B-2 Community Business

B-2(B) Office

C-1 General Commercial

C-1R Regional Commercial-Office
"The purpose of the Regional Commercial-Office zone is to provide areas for large scale retail businesses oriented to a regional consumer market, high quality office park development, and related consumer and business services."

B-3 Central Business District

C-2 Heavy Commercial/Light Industrial

M-1 Office and Industrial Park

M-2 Heavy Manufacturing

M-M Business Park
"The purpose of the "Business Park" zone is to provide for development of high quality, single or multiple tenant, campus style business parks which offer opportunities for a wide variety of non-retail businesses to locate in small to medium size office and warehouse spaces."

C Clinic and Medical Related Activities Overlay

O Office Overlay Zone

CO Clinic and Office Overlay Zone

PD Planned Development Overlay Zone
The purpose of the Planned Development overlay zone is to allow for commercial, industrial and mixed use developments which are of a unique character and desirable quality, and which are beneficial to the the area in which the property is located and to the community in general. The planned development overlay zone may only be applied to commercial or industrial zones.

Renton

Note: Zone descriptions are included for select zones only.

G-1 General
"The General Zone is established to provide and protect suitable environments for low density single family residential dwellings."

R-1 Residential

R-1-5 Residential

R-2 Residential

R-3 Residential

R-4 Residential

P-1 Public
"The Public Zone is established to provide and protect suitable environments for social and physical services and facilities."

B-1 Business
"The purpose of the Business District Zone is to provide for retail sales of products of every type and description, a wide variety of personal and professional services to clients and/or customers at the business location, and all manner of recreation or entertainment uses."

L-1 Light Industry
"The purpose of the Light Industry Zone is to provide areas for low intensity, non-nuisance generating in terms of odor, air and water pollution, noise, vibration and glare industrial activities."

H-1 Heavy Industry
"The purpose of the Heavy Industrial Zone is to provide areas for industrial activities involving fabrication, processing, bulk handling and storage, construction and heavy transportation.

O-P Office Parks
"The Office Park Zone is established to provide areas appropriate for professional, administrative, and business offices, certain manufacturing activities, and supportive services in a campus-like setting."

Seattle

Title 23

SF 5,000, 7200, and 9600 Residential, Single Family

LDT Lowrise Duplex/Triplex

L1, L2, L3, and L4 Residential, Multi-Family, Lowrise

MR Residential, Multi-Family Midrise

HR Residential, Multi-Family, Highrise

RC Residential-Commercial

MIO Major Institution Overlay

NC1 Neighborhood Commercial 1
"A small area composed primarily of businesses providing convenience retail sales and services to the adjoining residential neighborhood."

NC2 Neighborhood Commercial 2
"A pedestrian-oriented shopping area which provides a full range of household and personal goods and services, including convenience and specialty goods, to the surrounding neighborhoods."

NC3 Neighborhood Commercial 3

C1 Commercial 1

C2 Commercial 2

IG1 General Industrial 1

IG2 General Industrial 2

IB Industrial Buffer

IC Industrial Commercial

DOC1 Downtown Office Core 1

DOC2 Downtown Office Core 2

DRC Downtown Retail Core

DMC Downtown Mixed Commercial

DMR Downtown Mixed Residential

PSM Pioneer Square Mixed

IDM International District Mixed

IDR International District Residential

DH1 Downtown Harborfront 1

DH2 Downtown Harborfront 2

PMM Pike Market Mixed

UR Urban Residential

UG Urban General

UI Urban Industrial

Title 24

RD 7200 Duplex Residential Medium Density

RD 5000 Duplex Residential High Density

RM 800 Multiple Residence Low Density

RMH 350 Multiple Residence High Density

RMV 150 Multiple Residence Highest Density

RM-MD Multiple Residence Mixed Density
The RM-MD zone provides for variable density housing including tower apartment houses where such buildings have a desirable relationship with surrounding structures, and certain nonresidential uses compatible with housing and with adjacent commercial areas, located in close proximity to the City center or other major subcenters and employment areas, and having access to adequate transportation facilities and other amenity features."

BN Neighborhood Business
"The BN zone provides small areas in local neighborhoods for neighborhood retail stores near the homes which they serve."

BI Intermediate Business
"The BI zone, generally located on the boundaries of neighborhoods, provides for intermediate sized shopping areas to serve the abutting neighborhoods."

BC Community Business
"The BC zone provides for larger business centers serving the needs of several neighborhoods or the community district."

BM Metropolitan Business
"The BM zone protects the retail core of the Central Business District, fostering first floor retail frontages, and providing maximum safety, convenience and amenity for the pedestrian shoppers. Buildings of maximum bulk are permitted with incentives for plazas and arcades."

CM Metropolitan Commercial
"The CM zone permits a wide variety of nonretail commercial and business uses functionally related to and near the retail core of the business district in buildings of similar bulk to those in the BM zone."

CG General Commercial
"The CG zone, located in each major section of the City, permits nonretail commercial and business activity near major business districts and under conditions which minimize conflicts with nearby residential areas."

M Manufacturing
"The M zone provides for light manufacturing uses under specific conditions intended to minimize conflicts with nearby residential uses."

IG General Industrial
"The IG zone provides for a greater range of general industrial activities with provision for protecting adjacent residential zones."

IH Heavy Industrial
"The IH zone provides for and and protects the heaviest industrial activities prohibiting residential uses and in locations to achieve maximum isolation."

Spokane

CR Country Residential

RS Residential Suburban

R1 One-Family Residence

R2 Two-Family Residence

R3 Multifamily Residence

R4 Multifamily Residence

RO Residence-Office
"The RO zone is intended to accommodate relatively unobtrusive business and institutional uses of a type and in locations where they blend into medium-density or high-density residential areas."

B1 Local Business
"A local business zone is intended to provide in a residential neighborhood those day-to-day goods and services needed by the residents. Normally a B1 zone will collect such neighborhood shopping facilities in a central location at street intersections of from one to five acres in size, of usable land, rather than having business uses scattered throughout the neighborhood or in ribbon patterns along streets."

B2 Community Business
"A community business zone is intended to provide at a location convenient to arterial streets a shopping center for several neighborhoods, within an approximate one and one-half mile radius."

B3 Central Business
"The B3 zone is intended to accommodate a variety of goods, services, cultural, governmental, hospitality and other business uses in the city center to serve the entire metropolitan area."

C Commercial
"The commercial zone is intended to accommodate a variety of business, wholesaling, warehousing and light industrial uses which, though incompatible with B zones, need not be confined to industrial zones."

M1 Light Industrial
"The M1 zone is intended for those light industrial uses which produce little noise, odor and smoke and for industrial parks."

M2 Heavy Industrial
"The M2 zone is intended to accommodate heavier industrial uses at locations where there will be no interaction with residential uses. Residences are not permitted."

M3 Unrestricted Industrial
"The M3 zone is for heavy industry which necessarily produces offensive or somewhat hazardous impacts on surrounding properties. A residence is, therefore, not permitted."

Tacoma

R-1 One-family Dwelling
7,000 sq. ft. = 6.2 units/acre

R-2 One-family Dwelling
5,000 sq. ft. = 8.7 units/acre

R-2SRD Residential Special Review
3,000 sq. ft. = 14.5 units/acre

R-3 Two-Family Dwelling
3,000 sq. ft. = 14.5 units/acre

R-4 Multiple-family Dwelling
lot area not specified per unit

R-4-L Low-density Multiple-family
1,500 sq. ft = 29 units/acre

R-5 Multiple-family Dwelling
lot area not specified per unit

PRD Planned Residential Development

C-F-V Freeway Commercial Vehicular Services

C-F-P Freeway Commercial Personal Services

C-1 Commercial

C-2 Commercial

C-3 Commercial

B Business
"It is the intent and purpose of the Business District Regulation to foster development of compact, high-intensity uses of vertical construction which possess a high degree of architectural, aesthetic, and environmental quality, and to promote a broad range of uses which will maintain downtown Tacoma as an economically healthy regional activity center. The regulations encourage high-density uses such as offices and retail, commercial, and service businesses, as well as entertainment centers and light industrial uses, all of which will be oriented toward pedestrian activity and which will sustain the downtown as a healthy urban center."

M-1 Light Industrial

M-2 Heavy Industrial

M-3 Heavy Industrial

T Residential-Commercial Transitional
"The residential-commercial transitional district is designed primarily for office and institutional land uses which may may be carried on with no offensive noise, smoke, odors, fumes, or other objectionable conditions, in structures surrounded with ample space for yards and for off-street parking and the loading of vehicles."

MC Mixed Commercial
"The intent of the mixed commercial district is to govern the use and development of property surrounding downtown Tacoma by providing an appropriate and congruous transition between the high intensity Central Business District and its surrounding areas.

C-P-N Planned Neighborhood Shopping Center
"The Planned Neighborhood Shopping Center zone provides for the sale of daily living needs of the people, 'convenience goods' such as foods, hardware, and personal services. It may contain ten to fifteen stores generally oriented around a supermarket on a site from four to ten acres in size. It requires approximately seven thousand five hundred to twenty thousand people living close to the center to support it."

C-P-C Planned Community Shopping Center
The Planned Community Shopping Center zone provides in addition to 'convenience goods' a wider range of facilities for the sale of shopping goods such as apparel and furniture, as well as banking and professional services and recreation. It may contain twenty to forty stores generally oriented around a junior department store or variety store ion a site of from ten to thirty acres in size. It requires approximately twenty thousand to one hundred thousand people located within a short driving time from the center to support it."

C-P-R Planned Regional Shopping Center
The Planned Regional Shopping Center zone provides a variety and depth of 'shopping goods' comparable to the central business district including general merchandise, apparel and home furnishings as well as a variety of services and recreational uses. It may contain fifty to one hundred stores oriented around one or more major department stores on a site of thirty-five or more active. It requires approximately one hundred thousand to two hundred fifty thousand people located within a reasonable driving time from the center to support it."

R-P Research Park

PDB Planned Business Development
"The Planned Development District is intended to allow the establishment of planned business parks having a campus or park-like atmosphere with high amenity levels provided through broad landscaped setback areas, usable and functional open spaces, and high architectural quality."

PDI Planned Industrial Development
"The Planned Industrial Development District is intended to allow the establishment of planned industrial parks having a campus or park-like atmosphere with high amenity levels provided through broad landscaped setback areas, usable and functional open spaces, and high architectural quality."

Vancouver

R-1-5, R-1-6, R-1-7.5, R-1-10, and R-1-20: Residential
5,000; 6,000; 7,500; 10,000; and 20,000 sq. ft. =
8.7; 7.3; 5.5 ;4.4; and 22 units/acre

R-2 Residential
11.6 units/acre

R-3 Residential
21.8 units/acre

R-4 Residential
43.5 units/acre

R-5 Residential
43.5 units/acre

NC Neighborhood Commercial
"This district is intended to establish new locations, or recognize and maintain existing locations for small convenience and service commercial facilities which are to be carefully integrated into residential districts."

CC Community Commercial
"This district is intended to establish new locations, or recognize and maintain existing locations to provide for the shopping and service requirements of large sections of the community."

HC Highway Commercial
"This district is intended to establish new locations, or recognize and maintain existing locations of commercial establishments which require locations along highways or other heavily traveled thoroughfares."

RC Regional Commercial
"This district is intended to provide areas for large commercial centers for the shopping and service needs of the region."

DC Downtown Commercial
"This district is intended to cover downtown Vancouver and to facilitate the expansion there of commerce and community facilities consistent with the growth of the city."

ML Light Industrial
"This industrial district is intended for light, clean industries usually of a manufacturing or storage nature with little outdoor storage."

MH Heavy Industrial
"This industrial district is intended for manufacturing industries and large-scale fabricators, primarily metals and lumber, that usually require water access, highway access, and/or rail service."

Industrial-Commercial
"The purpose of this district is to permit flexibility for the development of combined industrial office parks where there is no outdoor storage and very low process visibility. Residential units

for the purpose of housing employees and their families are permitted. Commercial uses are permitted to support the employees in office or industrial complexes, but the intent of this district is not to create additional commercial areas to serve surrounding neighborhoods."

Residential Densities and Public Transportation

As noted earlier in this report, higher residential densities are considered important to the success of public transportation service. While many research studies of the relationship between residential densities and public transportation use have been conducted in recent years, the studies by Boris Pushkarev and Jeffrey Zupan are arguably one of the most often quoted of any research on this subject. Their research, summarized in Public Transportation and Land Use Policy (1977) and Urban Rail in America (1982), was among the earliest quantitative studies of the housing density-public transit relationship.

In the years since those studies were published, a number of their findings have been referenced in a wide variety of research reports and guides on the subject of land use-transportation linkage strategies. The extent to which their conclusions, and particularly their quantitative results, have been applied has been the subject of occasional critique. The following examples illustrate the assumptions upon which Pushkarev and Zupan's conclusions were based, and contrast those assumptions with the initial conditions of other studies that reference them.

One source of misunderstanding is a lack of awareness of the many assumptions that were used (and acknowledged) by Pushkarev and Zupan. In Public Transportation and Land Use Policy Pushkarev and Zupan made the following initial observations about the density-transit relationship (pg. 4 - emphases added):

> It should be emphasized that the number of variables which affect the answer to the question 'What density of transit service can be supported by what density of urban development?' is very large...
>
> On the demand side, these variables include: density, size, and type of the dominant nonresidential cluster; density of the residential area; the distance between them; the presence of other nonresidential clusters nearby; the density configuration of neighboring residential areas; the household size, income, and labor force participation of the resident population; and, last but not least, the fare, service frequency, and proximity to a transit line...
>
> On the supply side, route spacing, service frequency, service span, and operating speed define the density of service in terms of vehicle hours per unit of area; peak-hour demand at the maximum load point and the length of a route further affect the vehicle hours that must be provided to attain a given service level. Cost per vehicle hour for each mode falls within a fairly well defined range, but it does vary within it depending on wage rates and work rules. Further variables affect particular modes, such as acceptable

waiting time and responsive systems, and train length and, very importantly, the construction cost of guideways for systems that operate on fixed guideways.

Pushkarev and Zupan developed a supply-demand relationship for transit that postulated a correlation between the residential density of a transit service area and the level of usage of transit service. This relationship was based upon a number of assumptions regarding the variables mentioned above, including costs, service levels, geographic proximity, density, and population size and distribution, and used as an example the New York region.

Later in Public Transportation and Land Use Policy, Pushkarev and Zupan further qualified the residential densities that they had generated from their supply-demand analysis (pg. 148 emphases added):

> To recapitulate, the answer to the question, "What residential density can support what level of bus service?" depends on how far away a nonresidential concentration of what size the residential area in question is located; but, very importantly, it also depends on the density of the neighboring residential areas through which the route in question passes (the density gradient), and on the length of the route. Because of the multitude of values which these variables can assume, the feasibility of service in any particular residential area can, in principle, be only determined case by case...

Another area of misinterpretation of Pushkarev and Zupan's research arise from the use of abbreviated references to the "Summary and Interpretation" chapter of Public Transportation and Land Use Policy wherein the authors noted (pg. 173 emphasis added):

> ".....Average figures from a number of urban areas in the United States suggest that:
>
> 1. "At densities between 1 and 7 dwellings per acre, transit use is minimal"
> 2. "A density of 7 dwellings per acre appears to be a threshold above which transit use increases sharply."
> 3. "At densities above 60 dwellings per acre, more than half the trips tend to be made by public transportation."

The study also illustrates the density thresholds with photographs of residential neighborhoods. For example, seven dwelling units per acre were "...represented by single-family houses on 60 x 100 foot lots. On the average, this represents the threshold of transit-supporting density, allowing about half-hourly local bus service."

In many cases, only the condensed conclusions (most notably, the 7 dwelling unit/acre figure) are noted in other research publications; Pushkarev and Zupan's conditional remarks are generally not acknowledged in conjunction with these conclusions.

Even when the general applicability of their conclusions is questioned, misunderstandings sometimes arise. An example of this confusion may be seen in a 1978 report on the relationship between housing densities and the effectiveness of park-and-ride-based transit service in the Seattle area. In that report (prepared for Seattle METRO) entitled "Perspectives on Transit and Land Use Relationships", the consulting firm of Parsons Brinckerhoff Quade & Douglas, Inc. noted that

> ...Perhaps due to the collective responsibility of an aggressive transit marketing program, unique geographic limitations of the existing freeway system, and a positive historical concept of transit as a mobility system for more than just the transit dependent, 'transit behavior' in the metropolitan area (Seattle) is somewhat higher and atypical from national experience elsewhere, given similar factors of population and employment densities. Where Boris S. Pushkarev suggests that transit use is minimal below household densities of 7 dwelling units per acre, METRO is experiencing full capacity peak-hour use from the eastside area park-and-ride lots which are drawing from areas

barely even approaching 5 dwelling units per acre. This is being noted merely to keep in context the point that strict adherence to general 'rules of thumb' doesn't necessarily provide the insights one needs in examining the ridership potential for a given community or area." (pg. 17 emphasis added)

While the cautionary note to avoid "rules of thumb" is an important one, the 7 dwelling unit per acre threshold in Pushkarev and Zupan's study was not based on park-and-ride service. Rather, that density value was generated based on local bus service, with 30 minute headways, assuming 30 boardings per hour (which they termed as an "industry standard") and other assumptions. In fact, Pushkarev and Zupan did conduct a separate analysis of residential densities supportive of park-and-ride lots; their analysis included such attributes as the downtown size (millions sq. ft.), residential densities, distance to downtown, cost per passenger mile, and service (buses per two hour peak). Based on this analysis, Pushkarev and Zupan concluded (pg. 153 emphases added):

> At $0.10 per passenger mile, 5 buses can be supported during the two-hour peak if the downtown is 20 million square feet and at 5 miles the density is 3 dwellings per acre;
>
> or if the downtown size is 35 million square feet and at 5 miles the density is 2 dwellings per acre, at 10 miles the density is 3 to 4 dwellings per acre, at 15 miles the density is 4 dwellings per acre;
>
> or, if the downtown size is 50 million square feet and at 5 miles the density is 2 dwellings per acre, at 10 miles the density is 3 dwellings per acre, at 15 miles the density is 4 dwellings per acre, and at 20 miles (and a speed of 35 mph) the density is 4 dwellings per acre.

Pushkarev and Zupan extended this analysis to include 10 and 30 buses during the two-hour peak period, with costs of $0.10 per passenger mile and $0.20 per passenger mile. The requisite residential densities to support public transportation with these conditions ranged from 2 to 5 units per acre, with densities as high as 7 units per acre needed to support a transit system operating at $0.20 per passenger mile, with 30 buses during the two-hour peak, and serving a downtown of 20 million sq. ft.

Thus, an examination of Pushkarev and Zupan's research shows that their analysis could be in fact consistent with the notion that residential densities considerably below 7 units per acre were potentially supportive of park-and-ride systems. These figures, which are consistent with the Seattle results, were not cited in the Metro study (Pushkarev and Zupan did not include their conclusions about park-and-ride lot systems in the summary chapter of Public Transportation and Land Use Policy).

After looking at a number of studies which reference the results of Pushkarev and Zupan's research (both questioningly and uncritically), it appears that while the details of their analysis, and the extensibility of their conclusions, may be subject to debate, it is important to recognize the assumptions that were used to generate their original results, and to carefully compare them with the conditions to which they are sometimes being applied in other research studies.

About the Innovations Unit

The Innovations Unit is an advisory group to the Washington State Transportation Commission that conducts technology and policy research on emerging transportation developments and opportunities in Washington state. The goals of the Innovations Unit are to

- provide long-range program development support to the Transportation Commission,
- generate unfiltered visions of a wide range of future short-term and long-term transportation technology and policy options, and
- establish a research methodology that fosters development of innovative transportation concepts.

The Innovations Unit has three objectives representing successively more detailed and focused studies:

Objective 1. Monitor emerging technologies and strategies. Compile and synthesize up-to-date information about emerging and innovative transportation technologies, strategies, and policies.

Objective 2. Research selected topics of Commission interest. Conduct detailed background research of specific technology and policy issues, under the direction of the Commission's Long and Short Term Goals Subcommittee. Produce a series of white papers outlining technology and policy implications germane to the Washington State transportation system.

Objective 3. Support in-depth technology and policy research. Conduct and/or coordinate detailed research of key enabling technologies, strategies, and policies.

The research activities of the Innovations Unit emphasize early, preparatory studies of emerging potential transportation solutions, and include interaction with elected officials, public agencies, university researchers, the private sector, and members of the public. Its activities are intended to complement and support in-depth applied research and implementation by the Washington State Department of Transportation (WSDOT) through its Research Office, and reinforce ongoing State Transportation Policy Plan activities.