Parking Spaces / Community Places

Finding the Balance through Smart Growth Solutions

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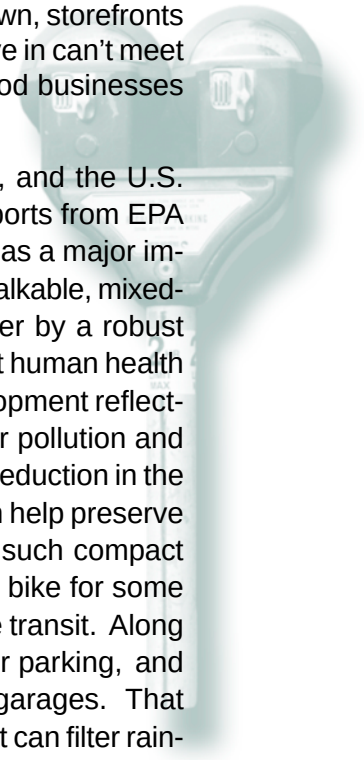
Introduction

When you shop, you may visit a mall, or go to your town's main street. At the mall, you probably cruise past rows and rows of empty parking, the spaces filled only one day a year. Maybe you head downtown, but can only find vacant storefronts. And where things are bustling, you can't find convenient parking near the stores you want to visit. All three of these scenarios represent a "parking problem" that has a negative impact on other community goals. At the mall, overbuilt parking consumes land and wastes money. Downtown, storefronts may sit empty because new businesses that would like to move in can't meet high parking requirements – and too little parking makes good businesses less viable.



But what does parking have to do with the environment, and the U.S. Environmental Protection Agency (EPA)? Research and reports from EPA and others show that the way we develop our communities has a major impact on the quality of the natural environment. Regions with walkable, mixed-use, compact neighborhoods, towns, and cities, knit together by a robust network of transportation and environmental corridors, protect human health and the natural environment. The research shows that development reflecting smart growth principles can lead to reduced growth in air pollution and less polluted runoff into streams and lakes. It also leads to a reduction in the amount of pristine land consumed by development, which can help preserve habitat for many species. Air pollution is reduced because such compact areas make it easier for some people to choose to walk and bike for some trips, and others will be able to drive shorter distances or take transit. Along with fewer and shorter trips by car comes a reduced need for parking, and that means less land needs to be paved for parking lots or garages. That reduces development costs and leaves more open ground that can filter rainwater, and more open space for birds, animals, and people to enjoy. For a thorough discussion of the connections between development patterns and environmental quality, see *Our Built and Natural Environments: A Technical Review of the Interactions Between Land Use, Transportation, and Environmental Quality* (EPA, 2001a).

Many communities are evaluating parking issues as part of a broader process of reevaluating their overall goals for growth. They want and need new residents and jobs – for vitality, economic growth, and other reasons – but they need to decide how and where to accommodate them. In cities, towns, and countryside, new and newly rediscovered development patterns offer solutions. In many places, walkable town centers that offer stores, workplaces, and housing in close proximity are replacing malls and office parks, offering shops and dining along with places to live and work. New neighborhoods offer different housing types and daily conveniences within a pleasant, safe walking distance. Vacant, underused and contaminated sites

can be reclaimed and benefit their communities with new jobs and housing, improved recreational opportunities, and increased fiscal stability. Many communities are working to offer choices to residents, so they can take a train, ride a bike, or walk instead of driving, if that is what is best for them and their families. Whether the resulting development patterns are called smart growth, quality growth, or balanced growth, they work by creating great places.

Communities and developers recognize that compact, mixed-use, walkable places need parking to thrive. Retail activity in particular requires convenient parking spaces that can handle high turnover. Businesses almost always need some parking for their employees, but the amount needed can vary widely. The need for parking may shift throughout the day as people come to shop, employees head to work, and residents go out for the evening. Residents and employees in more compact areas usually own fewer cars and drive less than is typical in conventional developments. Yet typical parking regulations and codes simply require a set amount of parking for a given square footage or number of units, assuming all trips will be by private automobile and ignoring the neighborhood's particular mix of uses, access to transit and walking, and context within the metropolitan region. Such inflexible parking requirements can force businesses to provide unneeded parking that wastes space and money. The space and money devoted to unnecessary parking could be used to accommodate other homes, businesses, shopping, or recreational opportunities in the community. In some cases, rigid parking standards can discourage or even prevent development, because providing it is just too expensive -- and developers are usually offered no alternative.

In cities and counties across the country, inflexible minimum parking requirements are the norm -- but they represent a barrier to better development, including redevelopment of vacant city land and contaminated sites. EPA developed this guide for local government officials, planners, and developers in order to:

- demonstrate the significance of parking decisions in development patterns;
- illustrate the environmental, financial, and social impact of parking policies;
- describe strategies for balancing parking with other community goals; and
- provide case studies of places that are successfully using these strategies.

The policies described in this report can help communities explore new, flexible parking policies that can encourage growth and balance their parking needs with their other goals. The case study in this report of the SAFECO Corporation (see page 50) illustrates the potential to use parking policies to

save money, improve the environment, and meet broader community goals. SAFECO has its corporate headquarters in the Seattle region. To accommodate new employees, this insurance company built three new buildings and underground parking garages. In an effort to balance parking needs with their financial, environmental, and design goals, they choose to offer employees transit passes, vanpool and rideshare incentives, or parking. Over 40 percent of SAFECO's employees choose an alternative to driving alone. As a result, each year SAFECO's 1700 employees drive about 1.2 million miles less than average commuters in the Seattle region, saving 28 tons of carbon monoxide, a serious pollutant tracked by the EPA. SAFECO also reduced the amount of ground that needed to be paved by 100,000 square feet, leading to less runoff in this rainy area. The company saves an estimated $230,000 per year, after accounting for the costs of incentives and the savings from reducing the amount of parking built.

Several EPA programs recognize the superior environmental performance of alternatives to driving alone and to conventional low-density, single-use development patterns. For example, EPA and the U.S. Department of Transportation sponsor the successful Best Workplaces for Commuters program (EPA, 2005a), which advocates employer-provided commuter benefits that encourage shifts from long-distance solo driving and parking. On a regional level, EPA offers areas that wish to recognize the emissions benefits of smart growth guidance for "Improving Air Quality Through Land Use Activities" (EPA, 2001b). EPA has also published "Protecting Water Resources with Smart Growth" (EPA, 2004), which includes 75 policies and programs that help meet water quality and other community goals. EPA and its partners in the Smart Growth Network (see box) also offer very successful resources on the policies and actions that create smart growth. "Getting to Smart Growth" (ICMA, 2002) and "Getting to Smart Growth II" (ICMA, 2003), published by the International City/County Management Association and the Smart Growth Network, detail 200 policies that communities have used to create new development to serve the needs of their residents and businesses, local governments, and the environment. For more information on these and other resources, and instructions on how to receive them, visit www.epa.gov/smartgrowth.

This report adds to this collection of resources, pointing communities and developers to proven techniques for balancing parking and other goals to enhance the success of new compact walkable places. The report begins with a discussion of the demand for parking and a review of the costs of parking. The following sections detail innovative techniques and case studies explain how they have been used to solve parking problems in specific places.

Principles of smart growth

Smart growth is development that serves communities, the economy, public health, and the environment. The original Smart Growth Network partners articulated the following principles describing smart growth, based on their experience in communities nationwide. These principles have since been adopted by many organizations and communities to help describe the development patterns they seek to create.

1. Mix land uses.

2. Take advantage of compact building design.

3. Create a range of housing opportunities and choices.

4. Create walkable neighborhoods.

5. Foster distinctive, attractive communities with a strong sense of place.

6. Preserve open space, farmland, natural beauty, and critical environmental areas.

7. Strengthen and direct development toward existing communities.

8. Provide a variety of transportation choices.

9. Make development decisions predictable, fair, and cost-effective.

10. Encourage community and stakeholder collaboration in development decisions.

For more information, visit www.epa.gov/smartgrowth.

About the Smart Growth Network

The Smart Growth Network, formed in 1996, is a loose coalition of organizations and individuals that believe that where and how we grow is important to our communities, health, and environment. The network is led by a partnership of over thirty private sector, public sector, and nongovernmental organizations that work to help create better development patterns in neighborhoods, communities, and regions across the United States. It also includes a membership organization of over 900 individuals, community organizations, and other stakeholder groups. These organizations endorse the principles listed on the previous page.

The Smart Growth Network partners range from planners and architects to developers and financiers and funders, from community advocates to traditional environmentalists, from real estate agents to transportation engineers, and include both governmental associations and parts of the federal government. For more information on the Smart Growth Network, its partners and membership program, and the annual New Partners for Smart Growth conference, visit www.smartgrowth.org.

Beyond Generic Parking Requirements

In calculating parking requirements, planners typically use generic standards that apply to individual land-use categories, such as residences, offices, and shopping. The most commonly used guidelines, issued by the Institute of Transportation Engineers in the Parking Generation Handbook (ITE, 2004), are based on observations of peak demand for parking at single-use developments in relatively low-density settings with little transit (Shoup, 2005). In such places, the destinations are widely separated, parking is typically free, and walking, biking, and transit are not available. As a result, planners assume in effect that every adult has a car, every employee drives to work, and every party visiting a restaurant arrives by car. Under these conditions, parking can take up more than 50 percent of the land used in a development (see figure). For more compact, mixed-use, walkable places, these standards end up calling for far more parking than is needed.

A surplus of parking really can be too much of a good thing. It creates a 'dead zone' of empty parking lots in the middle of what ought to be a bustling commercial district or neighborhood. This dead zone means there is less room for the offices and homes that would supply a steady stream of office workers and residents who might patronize businesses in the area -- and less room to cluster other businesses that will attract more foot traffic. Requiring more parking than the market actually demands adds substantial costs to development and redevelopment, and in some cases the added costs will prevent development altogether. For example, the future site of the D'Orsay Hotel in a prime location in Long Beach, California sat for years as a low-revenue parking lot -- every developer who considered building on it was stopped in part by the high cost of building a garage to fulfill the city's minimum parking requirement. It is under development today as a hotel and retail complex in large part because innovative strategies reduced the parking burden on the developer. See page 52 for the full case study.

Most planners surveyed relied on neighboring cities and national handbooks to determine parking requirements. This practice may result in inappropriate requirements if local conditions or policy approaches differ.

— Michael Kodama, Michael R. Kodama Planning Associates

Parking requirements are often copied from one jurisdiction to another, and so are remarkably consistent across different cities. Generic standards do not take into account the many highly local variables that influence parking, such as density, demographics, availability of public transit, potential for biking and walking, or the availability of other parking nearby. The obvious results of such rigid requirements are big empty parking lots -- and they can also result in empty buildings. Perfectly useable space in older buildings with limited or no on-site parking may prove unrentable, because the businesses that would like to locate there are unable to meet high minimum parking requirements. The buildings remain vacant, thwarting redevelopment plans (Shoup, 2005).

Generic parking standards have simply not kept up the complexity of mod-

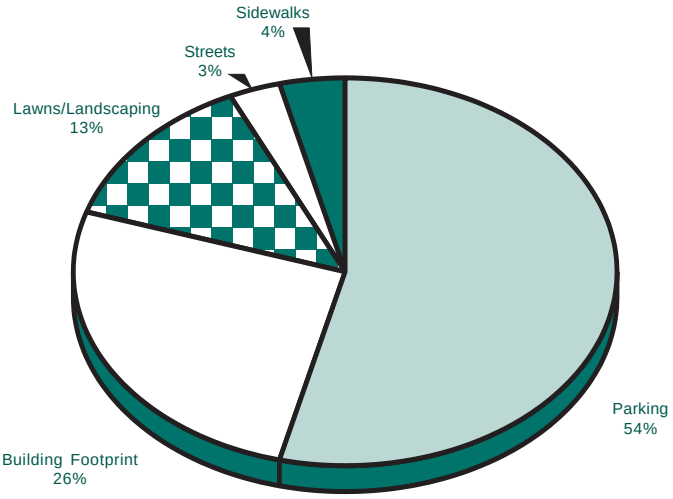
ern mixed-use development and redevelopment. But parking requirements can be altered to allow planners to better measure the true demand for parking and to balance parking with wider community goals. This approach entails careful consideration of land-use and transportation characteristics that relate to parking demand. Successful examples consider the following factors.

■ **Development type and size.** Take into account the specific characteristics of the project: is there a large theatre that requires evening parking, or will small shops attract short-term, daytime patronage? Can the two share parking spaces? Parking demand is of course also influenced by the size of the development, which is typically measured by total building square footage.

■ **Development density and design.** Consider the density of the development. Research shows that each time residential density doubles, auto ownership falls by 32 to 40 percent (Holtzclaw et al. 2002). Higher densities mean that destinations are closer together, and more places can be reached on foot and by bicycle—reducing the need to own a car. Density is also closely associated with other factors that influence car ownership, such as the presence of good transit service, the community's ability to support stores located in neighborhoods, and even the walkability of neighborhood streets.

■ **Demographics.** Consider the characteristics of the people using

Site Coverage
for Typical Commercial Development
(averages for Olympia, Washington)



Source: City of Olympia Public Works Department, and the Washington State Department of Ecology, 1995.

In the process of establishing parking requirements, local communities are sometimes engaged in a balancing act. They must consider access, mobility, and traffic safety, but they also must encourage appropriate land use and traffic management, environmental protection, and energy and resource conservation.

— Thomas P. Smith
"Flexible Parking Requirements"
Planners Advisory Service
Report 377

the development, including employees, customers, residents, and visitors. People of different incomes and ages tend to have different car ownership rates.

- **Availability of transportation choices.** Take into account the modes of transportation available to employees, visitors, and residents. Access to public transportation in a particular development, for example, can reduce parking demand. Walkable neighborhoods and bicycle amenities can also reduce parking demand.

- **Surrounding land-use mix.** Consider the neighboring land uses and density to better understand parking needs. For example, an office building parking lot will be empty when the restaurant next door is packed, so requiring both to provide for 100 percent of their parking needs simply wastes space.

- **Off-site parking.** Consider the parking that is already available nearby: on the street, on nearby properties, or in public garages that may be available for users of a new development. On-street parking can be considered to reduce the amount of on-site parking required for new development, or as a reserve should new uses require more parking than expected. On street parking has the added benefit of acting as a buffer between pedestrians and traffic, increasing the attractiveness of walking.

Land use and demographic information are important tools for establishing context-specific parking requirements that better balance supply and demand for parking.

The Costs of Parking

This section describes the costs of providing parking, both in terms of financial and environmental health. While parking is necessary, providing too much of it can exert a high cost, so understandings its impact is important. That impact can vary considerably with the amount and type of parking provided, and the types of development being served.

Financial Costs

The financial cost of providing parking is driven by three key factors: the number of parking spaces required, the 'opportunity cost' of the land used for parking, and the cost per parking space[1]. Parking requirements that assume suburban levels of demand in urban locations may necessitate large surface lots or parking garages, unnecessarily increasing the cost of infill and other compact development. The opportunity cost is the cost of using a space for parking instead of for a use with higher value. This varies considerably depending on the development context. In infill locations, the opportunity cost can be quite high, as each on-site parking space can reduce the number of new housing units or other users by 25 percent or more (Transportation and Land Use Coalition, 2002).

The cost per space depends on engineering and design considerations. Cost per parking space includes land, construction, maintenance, utilities, insurance, administrative, and operation costs (Tumlin and Siegman, 1993). The per-space costs tend to be higher in infill locations, providing a strong incentive for avoiding a parking surplus. Towns that are trying to encourage infill development or compact new suburbs can help spur those activities by accurately gauging parking demand. In general, the following factors affect the cost per space of parking:

- **Structured versus surface parking.** Parking garages are more costly to construct, operate, and maintain than surface parking lots, but can be desirable in urban locations seeking to create a more walkable environment. For example, Shoup (1998) reports construction costs of over $29,000 per space for a structured garage in Walnut Creek, California, against perhaps $2,000 per space to construct surface parking. Underground parking structures are more costly to construct than above-ground structures because of the added expense of excavation and required engineering.

Ignoring both the cost of providing parking spaces and the price charged for parking in them, urban planners thus set minimum parking requirements to satisfy maximum parking demand.

— Donald Shoup
Department of Urban Planning, UCLA

[1] All costs are updated to 2004 dollars. Costs include various components as noted. Where amortized, they assume a 7.5% interest rate over a 30-year period, and annual operating costs.

- **Land cost.** Land costs vary widely across settings (urban/suburban), geographic areas, and location within a particular city. Land costs in urban centers are generally much higher than in suburban areas. For example, in 1997 the cost per square foot of land in downtown Charlotte, North Carolina, was $121, while suburban land cost $21 (ULI, 1997). Higher land costs make the efficient supply and use of parking critical to development and redevelopment in urban areas.

- **Configuration and size of parking facility.** Parking structures and lots are more expensive to build and operate on smaller lots and complex land configurations, due in part to economies of scale. For example, smaller garages have higher costs per parking space because of the fixed capital costs (e.g., stairwells, ramps, and elevators) and fixed operating costs. These characteristics—smaller lots and more complex land configurations—are typical of urban areas, making parking more expensive at these locations.

- **Geologic conditions.** Parking structures on land with more sensitive seismic conditions or land with difficult terrain also cost more per parking space because they require more complex engineering and construction design. While geologic conditions vary across the country, developers have a greater choice of sites when considering development in suburban and rural areas. Sites in urban areas are more limited, and terrain with geologic constraints may be more difficult to avoid.

Land and construction costs, which account for most of the costs of parking, vary considerably across cities and parking designs. Construction costs alone also range widely due to building codes, materials, and labor costs, but per space construction costs for structures (above- or below-grade) are typically much higher than for surface lots. Willson (1995) expresses parking costs in terms of a monthly amount that would pay for the land, construction, and operating costs of providing a parking space. The reported monthly cost calculated for six surface parking sites in Southern California ranged from $50 to $110 per space, with an average of $86. The average cost for two sites in Southern California with above ground structured parking was $175 per space per month. Litman (2004) analyzes cost-recovery thresholds for parking under various scenarios, finding a range from $20 to nearly $200 per month to finance, build, operate, and maintain a parking space. With such wide variability, national averages, especially those including land costs, clearly do not have much meaning. This underlines the

importance of looking at costs for a specific area when assessing potential savings from reducing oversupply.

Environmental Costs

In addition to tangible financial costs, parking has 'external' costs that affect the natural environment and the surrounding community, and these are typically not factored into development decisions. Parking lots and garages themselves have a direct impact on the environment, and they can affect the environment indirectly by cutting off transportation choices, encouraging driving that pollutes the environment.

Direct environmental impacts include: degraded water quality, stormwater management problems, exacerbated heat island effects, and excessive land consumption. Construction of surface parking often paves ground that once absorbed and filtered rainwater. This increases stormwater runoff, which can result in more flooding. The oil and other pollutants washed off the parking lot exacerbate water pollution. Dark pavement can artificially raise air temperature, resulting in 'heat islands' that raise air-conditioning bills. In undeveloped areas, forests, wetlands and other natural features should be considered part of a region's "green infrastructure" that process stormwater, clean the air, and provide wildlife habitat. Ensuring that parking areas are sized to a development's actual needs instead of to a generic requirement can preserve this infrastructure.

Parking also indirectly affects the environment, primarily because parking influences how and where people choose to travel. In conventional low-density, single-use development, the required large surface parking lots create places that are not friendly to pedestrians or transit. These places also require more and longer trips between homes, workplaces, schools, shops, and parks. As a result, people make the rational choice to drive almost everywhere -- and these areas register more vehicle miles of travel per capita. Increases in travel rates are associated with increased emissions of pollutants, including carbon monoxide and the pollutants that contribute to dangerous ground-level ozone. Air pollution is associated with asthma and many other health problems, driving up health-care costs.

Compact development that mix uses can reduce the need for surface parking, preserving green infrastructure while also reducing the amount of driving necessary for community residents. By creating an environment that supports the efficient use of parking, such development can also lead to better balance between parking needs and other community goals.

For further discussion of the environmental impact of development patterns, see *Our Built and Natural Environments: A Technical Review of the Interactions between Land Use, Transportation and Environmental Quality* (EPA, 2001a).

Innovative Parking Alternatives

As local governments respond to public demand for better development patterns, many have created alternatives to inflexible minimum parking requirements. The alternatives are aimed at avoiding an oversupply of parking, minimizing parking demand, or using the power of the marketplace to regulate parking. In areas of existing development, avoiding oversupply encourages better use of existing parking facilities and better evaluation of parking needs. Other policies give people an alternative to driving, and so reduce the demand for parking. And market-based pricing systems can help better match demand and supply, ensuring expensive parking spaces are used efficiently. Some of these strategies have lowered total development costs, further encouraging compact, mixed-use development patterns that moderate parking demand.

This section presents a selection of policies that make parking requirements more flexible. It includes a discussion of how and why these alternatives were developed, their advantages and limitations, and real-world examples. Each application has its own unique characteristics, and this diversity makes it impossible to isolate the costs and benefits of specific policies. The discussion presented here is not intended to portray any specific policy as universally applicable. Rather, community context should always be considered when balancing parking with other goals.

Strategies That Work

Parking Alternative	Example Location
Context-Specific Requirements	Montgomery County, Maryland Milwaukee, Wisconsin Los Angeles, California Eugene, Oregon Seattle, Washington Boston, Massachusetts
Centralized Parking, In-Lieu Fees	Miami, Florida Chattanooga, Tennessee West Palm Beach, Florida
Shared Parking	Long Beach, California Indianapolis, Indiana
Other Supply Strategies	Portland, Oregon Redmond, Washington Iowa City, Iowa
Land Banking and Landscape Reserves	Portland, Oregon Palo Alto, California Carmel, California Cleveland, Ohio Iowa City, Iowa
Car-Sharing	Boston, Massachusetts Washington, DC San Francisco, California Seattle, Washington Boulder, Colorado
Subsidies for Transit	Boulder, Colorado Santa Clara County, California San Bernardino County, California Montgomery County, Maryland
Transit Improvements	Portland, Oregon Chattanooga, Tennessee
Pedestrian and Bicycle Facilities	Schaumburg, Illinois Kendall, Florida
Transportation Demand Management Programs	Cambridge, Massachusetts Seattle, Washington Montgomery County, Maryland
Pricing Strategies	Los Angeles, California Santa Monica, California San Diego, California Pasadena, California

Reduce Oversupply

As discussed earlier, in communities working to create mixed-use, compact, walkable places, inflexible application of conventional minimum parking requirements tends to create an oversupply of parking. This creates unnecessary environmental impacts and fi-

nancial costs. The strategies discussed below can reduce the supply of parking while still effectively meeting demand.

Context-Specific Standards

Setting parking standards to fit the particular context of a neighborhood or development is a challenge planners are just beginning to tackle. As discussed earlier, parking requirements are often applied for each land use city wide, and so lack the flexibility needed to address different parking needs.

A major challenge for city planners is how to make codes more flexible and sensitive to specific local conditions, but still provide the predictability desired by developers. Codifying reductions in parking requirements provides the greatest certainty for governments, citizens and neighbors, and developers, and enables all to plan for balancing parking with other development goals. When the reductions in parking requirements are clearly stated in the codes, developments are less likely to be held up in the permitting process or challenged by local residents. Planners need to develop an understanding of local parking markets, combine this with experience from other settings, and then create local parking requirements. Some of the mechanisms being used are:

- **Transit zoning overlays.** In areas with frequent transit service, especially those served by rail stations, fewer residents, workers, and shoppers require parking. In addition, the density and mix of uses possible around rail stations can sometimes support market-rate parking, which leads to more efficient use. Many cities find they can reduce minimum parking requirements for certain uses that are within a specified distance of a rail station or frequent bus route. For example, Montgomery County, Maryland reduces parking requirements by as much as 20 percent, depending on distance from a Metrorail station. Parking are only one aspect of transit zoning overlays, which often address issues such as density, design, and allowable uses. Codes may encourage shared parking in transit zones, which accommodates more cars than parking reserved solely for residents and commuters.

- **New zoning districts or**

Location- and Use-Specific Requirements

Milwaukee, Wisconsin

Milwaukee has some of the lowest city wide parking ratios anywhere in the country. Parking ratios for retail are two spaces per 1,000 square feet, compared to the Institute of Transportation Engineers' standard of one to 300 square feet. For business uses, Milwaukee requires eight spaces for the first 2,000 square feet, and one for each subsequent 1,000 square feet. In the downtown zone, there are no minimum parking requirements for any land use except high-density housing, where the ratio is a very low two spaces per three units. The city generally discourages surface lots within the downtown and dictates that at least 50 percent of the ground floor of parking structures be used for retail.

These policies were enacted in 1986 and strengthened in October 2002 with new credits for transit-oriented development, on-street parking, and shared parking. Developments within a defined geographical area near transit (which encompasses over half of the city area) are granted reductions of up to 15 percent in the minimum requirements. Further reductions are allowed for on-street spaces adjacent to the property (up to a 1:1 space credit), and for shared parking (up to 0.75 space credit for each shared space). One to one credits are also allowed for leased parking spaces in existing lots within 750 feet of the site.

Source: Milwaukee Department of City Development, 2002.

specific plans. In compact, mixed-use, walkable neighborhoods and town centers parking requirements can frequently be lower than typical minimum requirements. Some communities have adopted designated zoning districts or neighborhood specific plans to accomplish this. Most commonly, this applies to the downtown; Milwaukee finds that parking and other goals can be met with lower parking requirements than in outlying locations. Some areas waive the minimums altogether, letting the development market decide where and how to build parking. The same techniques can be applied to neighborhoods outside of downtowns that offer frequent transit, such as Seattle's Pike/Pine district. Specific plans, which detail development requirements at the parcel level, are particularly useful to encourage infill development in older neighborhoods or on brownfield sites.

Location- and Use-Specific Requirements
Seattle, Washington

Seattle's zoning code grants reductions in minimum parking requirements based on several factors, including:

- Affordable housing. Minimum parking requirements are reduced to between 0.5 and 1.0 space per unit, depending on income, location, and size of unit.
- Senior housing and housing for people with disabilities.
- Car-sharing. Only for multi-family developments that allow dedicated on-site parking for the city's recognized car-sharing operator.
- Location. No parking minimums are set for downtown and they are reduced in mixed-use, dense neighborhoods.\

Source: Seattle Department of Transportation, 2001.

- **Parking freezes.** The amount of parking required can be directly reduced through parking freezes that cap the total number of parking spaces in a particular metropolitan district. . Cities with successful parking freezes generally have strong economies and well developed transit systems, and are attractive to tenants, customers, and visitors. Such cities can attract businesses because the benefits of the urban location outweigh the potential drawback of limited parking, and because public transit offers a viable alternative to automobile use. Downtown Boston has had a parking freeze in effect for many years in an effort to control driving and the associated emissions. Downtown San Francisco has applied a cap on commuter parking, as their downtown street network functions at capacity during rush hours, and transit and other travel options are numerous. Jurisdictions using the restrictions generally view each new parking space (commuter spaces in particular) as the generator of one more rush-hour vehicle trip, and want to limit those trips to reduce air pollution and congestion.

- **Reductions for affordable and senior housing.** Successful regions frequently struggle to provide affordable housing, as desirability and supply drive up housing prices. In many of these places, providing housing to lower-income workers and senior citizens can become an important goal. Since people with lower incomes and older people tend to own fewer vehicles parking requirements can

be reduced for below-market-rate units and senior housing. This reduces the overall cost of providing such housing, and may increase the number of units that can be provided. Los Angeles grants a reduction of 0.5 spaces per unit for deed-restricted affordable housing units, with further reductions if they are within 1,500 feet of mass transit or a major bus line.

- **Case-by-case evaluation.** Where area-wide or systematic code changes are not possible, reductions in parking requirements can be granted on a case-by-case basis, often on the condition that mitigation measures such as car-sharing (see page 23) are provided. Cities such as Eugene, Oregon specify in their zoning codes that such reductions will be granted subject to a parking study showing that the proposed provision will be adequate to meet demand.
- **Abolish requirements.** Another approach is for cities to simply abolish all parking requirements in neighborhoods that are served by a range of travel options and where surrounding residential areas are protected from spillover parking from other users (Millard-Ball, 2002). This leaves it up to developers—who have a financial interest in meeting tenants' needs while not oversupplying parking—to determine how many spaces are needed.

Maximum Limits and Transferable Parking Entitlements

Maximum limits turn conventional parking requirements upside down by restricting the total number of spaces that can be constructed. Planners set maximum limits much as they set minimum requirements. Typically, a maximum number of spaces is based on the square footage of a specific land use. For example, Portland, Oregon, allows buildings in the central business district a maximum of 0.7 parking spaces per 1,000 square feet of office space, and 1.0 space per 1,000 square feet of net building area for retail.

The generous parking capacity required by planners often goes unused. Studying office buildings in ten California cities, Richard Willson (1995) found that the peak parking demand averaged only 56 percent of capacity.

— Donald Shoup, UCLA

Communities can make maximum parking requirements more flexible by introducing transferable parking entitlements, as in Portland Oregon. The allowed number of parking spaces for a particular development are an "entitlement" that can be transferred or sold to another development if they are unused. This policy enables cities to control the parking supply, without restricting developments that would not be feasible without additional parking. Projects that require more parking can proceed, while those that need less parking can benefit by selling their rights, or negotiating shared parking agreements for their employees or customers.

Portland's planners are using parking maximums in an attempt to "improve mobility, promote the use of alternative modes, support existing and new economic development, maintain air quality, and enhance the urban form of the Central City" (City of Portland, 1999). By combining maximums with transferable parking entitlements, Portland's downtown provides ample

parking for retail and other priority uses, along with market-rate commuter parking, in a compact, walkable area with a mix of uses and transportation choices.

Both planners and developers benefit from restricting the number of parking spaces allowed. From the city's perspective, maximum limits:

- Improve the urban environment by preserving open space and limiting impervious surfaces;
- Reduce congestion;
- Encourage attractive, pedestrian-friendly urban design; and
- Promote transportation choices.

From the developer's perspective, maximum limits:

- Minimize costs for parking construction, operations, and maintenance;
- Reduce traffic and traffic-related costs; and
- Allow development at a greater floor-to-area ratio, increasing leasable space.

There are challenges to setting and maintaining maximum limits. Planners must consider possible spillover parking in surrounding residential neighborhoods if parking in those areas is free.. To avoid such spillover, developers must understand the factors that affect parking demand and ensure that viable transportation choices exist. A common policy for preventing parking spillover into residential areas is to implement residential parking permit programs, but these have drawbacks (see discussion of parking benefit districts on page 33). Changes in frequency or routing of transit, increases or decreases in development densities, or changes in land use can all influence the demand for parking in the neighborhood.

Linking Maximum Limits and Transit Improvements
Portland, Oregon

In Portland, Oregon, maximum parking limits vary according to distance from light rail stations. For example, new office space on the light rail transit mall is allowed 0.8 spaces per 1,000 square feet, while office space in Goose Hollow, located several blocks from the transit mall, is allowed 2.0 spaces per 1,000 square feet.

These maximum limits have not been problematic to developers. In fact, property values and customer volume in the parking-restricted areas near transit stations are higher than in other areas. In a 1987 survey of 54 businesses located near light rail transit, 66 percent of business owners said that their businesses had been helped because they were located near public transit; 54 percent reported increased sales volumes as a result of being located near transit, in spite of reduced parking supply.

Source: Tri-County Metropolitan Transportation District of Oregon, 1999.

With restrictive maximum limits on the number of parking spaces, developers may worry about the long-term marketability of a property. Marketability should not be a concern for competing developments in the same locale if all developments must adhere to the maximum limits. Parking restrictions that may seem to place urban areas at a disadvantage can be offset by amenities other than parking, such as convenient access to services and places of employment, attractive streetscapes, or pedestrian-friendly neighborhoods. City governments and developers should

incorporate these elements to attract businesses and residents. Maximum requirements are not ideal for all locations. Municipalities that employ maximum requirements must have accompanying accessible and frequent public transportation. It is also important for the area to be sufficiently stable economically to attract tenants without needing to provide a surplus of parking. A number of cities have implemented maximum parking requirements, including San Francisco and Seattle.

Shared Parking

The concept of shared parking is based on the simple idea that different destinations attract customers, workers, and visitors during different times of day. An office that has peak parking demand during the daytime, for example, can share the same pool of parking spaces with a restaurant whose demand peaks in the evening. The first shared parking programs arose when developers, interested in reducing development costs, successfully argued that they could accommodate all demand on site with a reduced number of spaces. The Urban Land Institute (ULI) report *Shared Parking* (2005) presented analytic methods for local governments and developers to use on specific projects, and as mixed-use projects continue to grow in number and sophistication, ULI continues to update this methodology.

By allowing for and encouraging shared parking, planners can decrease the total number of spaces required for mixed-use developments or single-use developments in mixed-use areas. Developers benefit, not only from the decreased cost of development, but also from the "captive markets" stemming from mixed-use development. For example, office employees are a captive market for business lunches at restaurants in mixed-use developments.

Shared parking also allows for more efficient use of land and better urban design, including walkability and traffic flow. Shared parking encourages use of centralized parking lots or garages and discourages the development of many scattered small facilities. A sidewalk with fewer driveway interruptions and more shop fronts is more comfortable and interesting for pedestrians and will encourage walking. Reducing driveways also results in more efficient traffic flow because there are fewer turning opportunities on main thoroughfares. This has the added benefits of reducing accidents and reducing emissions from idling vehicles stuck in traffic.

Establishing shared parking requirements involves

Shared Parking

Circle Centre — Indianapolis, Indiana

Opened in September 1995, Circle Centre in Indianapolis' central business district offers retail and entertainment destinations. This development contains 630,600 square feet of retail space and100,000 square feet of restaurant, speciality, and entertainment space, as well as a 2,700-seat cinema. One of the factors that led to the financial success of this $300 million project was a shared parking arrangement that saved money and allowed a pedestrian-friendly design.

Under generic minimum parking requirements, Circle Centre would have needed about 6,000 parking spaces. By using shared parking, the project was built with just 2,815 spaces. Shared parking for Circle Centre is used for both customers and employees. The mixed-use nature of the development project allows customers to use a single parking space for multiple destinations within the complex. Employees can use nearby off-site parking, particularly in evenings and on weekends when more than 12,000 nearby off-site spaces that normally serve downtown office workers become available. Taking these two shared parking components into account decreases the estimated need for on-site parking by more than 50 percent.

This reduction in parking demand translates into considerable cost savings. At parking costs of about $10,000 per space for aboveground structured parking, development costs were reduced by about $30 million.. In addition, operating costs were reduced by approximately $1 million per year.

Source: Smith, 1996.

site-specific assessment or use of time-of-day parking utilization curves, which were developed by the ULI in *Shared Parking.* Planners need to consider several factors when developing shared parking requirements, including the physical layout of the development; the number of spaces for each of the individual land uses; the types of parking users (e.g., employees, residents, or hotel guests who park all day, or customers and visitors who park for short periods of time); and hourly accumulation of parking for each land use.

Montgomery County, Maryland, allows for shared parking to meet minimum parking requirements when any land or building under the same ownership or under a joint-use agreement is used for two or more purposes. The county's ordinance also allows parking reductions based on proximity to transit, participation in TDM programs, or location in the central business district. The county uses the following method to determine shared requirements for mixed-use developments:

Calculating Parking for Mixed-Use Developments (Montgomery County, Maryland)

	Weekday		Weekend		Nighttime
	Daytime (9 a.m. - 4 p.m.)	Evening (6 p.m. - 12 a.m.)	Daytime (9 a.m. - 4 p.m.)	Evening (6 p.m. - 12 a.m.)	(12 a.m. - 6 a.m.)
Office	300*	30	30	15	15
Retail	168	252	280*	196	14
Entertainment	40	100*	80	100*	10
TOTAL	**508**	382	390	311	39

* Peak demand by use.
Source: Smith 1983, page 7.

- Determine the minimum amount of parking required for each land use as though it were a separate use, by time period;
- Calculate the total parking required across uses for each time period; then
- Set the requirement at the maximum total across time periods.

The table above illustrates how peak demand occurs at different times of the day and week for different land uses. While maximum parking demand for the office component of the project occurs during the daytime on weekdays, maximum demand for retail occurs during the daytime on weekends, and peak entertainment demand is in the evening. For this example, setting parking requirements using maximum demand would have resulted in requiring 680 spaces (300 spaces for office, 280 spaces for retail, and 100 spaces for entertainment). By recognizing the shared parking potential, the developer cut almost 200 unnecessary parking spaces (about 25 percent), represent-

ing a considerable cost savings.

An American Planning Association report, *Flexible Parking Requirements*, highlights factors that facilitate shared parking (Smith, 1983). The report suggests that for shared parking to function effectively, parking requirements for individual land uses must reflect peak-demand land use and common parking facilities must be near one another. Parking spaces should not be reserved for individuals or groups.

Centralized Parking
Chattanooga, Tennessee

To encourage urban development in downtown Chattanooga while limiting congestion and air pollution, the Chattanooga Area Regional Transit Authority (CARTA) developed a strategy to provide peripheral parking and a free shuttle service. The system is designed for the city's linear central business district and allows workers and visitors to drive to the city, park in one of the two peripheral garages, and use the shuttles to travel up and down the 15-block business corridor. By constructing parking at either end of the business district, CARTA intercepts commuters and visitors before they drive into and through the city center, reducing traffic congestion.

The two parking garages Shuttle Park South (550 spaces) and Shuttle Park North (650 spaces), are owned by CARTA and operated privately. The free shuttle buses are financed through the garages' parking revenues. They depart from each garage every five minutes all day, every day, and pass within walking distance of most downtown destinations.

The electric-powered shuttles transport approximately one million riders each year, making shuttle-served property attractive to businesses. Since 1992, when the shuttle service began, over $400 million has been spent on development in Chattanooga, including the successful aquarium, over 100 retail shops and over 60 restaurants. CARTA's initiatives won commendation from EPA, receiving a "Way to Go" award in 1996 for innovative transportation solutions that support urban development.

Sources: EPA, 1998; Chattanooga News Bureau, 1999.

Centralized Parking Facilities and Management

A subset of shared parking is the construction of centralized parking lots and garages. Some cities mandate centralized parking facilities and finance them through development impact fees, in lieu parking fees, or negotiated contributions established during the environmental review process. Centralized parking can be built and operated by a public entity or public/private partnership and reduce the costs of parking because large facilities are less expensive on a per space basis to build and maintain than small facilities. The example in the next chapter of Wilton Manors, Florida, is such a case.

Centralized parking facilities can meet urban design goals if they allow the elimination of small surface parking lots and driveways that interrupt the walkable fabric of mixed-use areas. Centralized parking enables travelers to park once to visit several destinations, potentially reducing on-street congestion from short trips within an area. Developers are sometimes concerned that centralized parking will be inconvenient for building occupants, but these concerns can be addressed in part by building several "centralized" facilities throughout a business district or mixed-use area. Centralized management can still ensure coordinated policies for their use, maintaining many of the advantages of centralized parking. In other cases, the operator can provide shuttle services to and from centralized garages. Many downtown areas have successfully instituted centralized parking. Some cities, such as Pittsburgh and Chattanooga (see box) operate such facilities at the periphery of the downtown, reducing traffic and mobile source emissions in the core and freeing up land in the center city for other development.

In-Lieu Parking Fees

In-lieu parking fees are one way to finance such centralized public garages and give developers flexibility in providing parking on-site. Developers

are able to avoid constructing parking on site by paying the city a fee, and the city in return provides off-site parking that is available for use by the development's tenants and visitors. The city determines the fees, generally based on the cost of providing parking.

Cities set fees in one of two ways, either by calculating a flat fee for parking spaces not provided by a developer on site, or by establishing development-specific fees on a case-by-case basis. Shoup (2005) reports that in-lieu fees in the United States range from $2,000 to $20,000 per parking space and may or may not reflect the true costs of providing parking. These fees can be imposed as a property tax surcharge or at the time of development permitting.

In-lieu parking fees provide a mechanism for providing parking in balance with other community goals, satisfying the public as well as planners and developers. Using in-lieu fees and centralized garages can:

- Reduce overall construction costs;
- Avoid construction of awkward, unattractive on-site parking that could compromise historic buildings;
- Increase public access to convenient parking;
- Ensure that parking facilities will be used more efficiently; and
- Encourage better urban design with streetscapes uninterrupted by parking lots and driveways.

In establishing in-lieu parking fees, planners must be aware of potential developers' concerns that the lack of on-site parking will make developments less attractive to tenants and visitors. This can be an issue if available public parking is insufficient, inconveniently located, or inefficiently operated. Planners must carefully consider the parking demand for each participating property and provide enough parking to meet this demand in order to avoid creating a perceived or real parking shortage. Planners must also work to ensure that public parking facilities are located and operated in ways that support development.

In-Lieu Parking Fees

Coconut Grove — Miami, Florida

Coconut Grove is a pedestrian-oriented, entertainment, dining, and shopping village in southern Miami. To maintain Coconut Grove's continuous street frontage and keep it attractive to pedestrians, city planners established flexible parking requirements. Developers or property owners have three choices for satisfying minimum parking requirements: they can provide off-street parking, contract spaces elsewhere, or pay in-lieu fees. With little space left to develop and high land costs, most property owners choose to pay the $50 per space per month fee to the city and use the land for more productive, revenue-generating purposes. The city uses the in-lieu fees to provide shared, structured parking, improve transit service, and maintain the sidewalks and pedestrian amenities. By investing the in-lieu fees in a combination of parking and other improvements, the city helps to keep Coconut Grove walkable and maintain the attractive aesthetic character of the area.

Source: Coconut Grove Chamber of Commerce.

Accounting for Uncertainty

Estimating parking demand is not an exact science, and a few communities are setting aside land through land banking and landscape reserves that can be converted into parking if shortages arise. Landscaping can often be used to turn this set-aside land into an attractive amenity for the development

or wider community, but requiring new development to purchase additional land as insurance against uncertain parking demand imposes additional costs, which may work against community redevelopment goals.

Land banking and landscape reserves are particularly useful policies when the expected need for off-street parking for a particular use is uncertain, due to unknown or unusual operating characteristics, or if no data is available to establish need. Cities could respond by requiring the construction of parking spaces that may well sit empty. But these techniques allow supply to be determined by the best estimates, with the security that more parking can be constructed if needed. In some cases, landscape reserves can be required in conjunction with parking reductions granted in return for company plans to reduce private vehicle trips, known as Transportation Demand Management (TDM) plans. If the employer falls out of compliance with the TDM plan, they can be required to go to the expense of constructing additional parking.

Land Banking

Iowa City, Iowa, and Palo Alto, California

Both Iowa City and Palo Alto have enacted land-banking policies in their parking codes. In some neighborhood commercial zones in Iowa City, minimum parking requirements may be waived or relaxed, and land banking used in place of up to 30 percent of the otherwise required parking. If an enforcement official determines in the future that the additional parking spaces are needed, the property owner can be required to construct parking on the land banked area.

Palo Alto's code authorizes the city to defer up to 50 percent of the required spaces as a landscape reserve where the expected need for off-street parking for a particular development is uncertain. The California Park Apartments development, for example, was allowed to defer 22 of the 95 parking spaces required by city code, using the land instead for a family play lot, a barbeque area, and picnic benches. Nearly 15 years after construction, the landscape reserve has not been needed for parking, and the community enjoys the environmental and social benefits of the recreation area.

Source: Iowa City and Palo Alto Zoning and Parking Codes.

Land banking and landscape reserve policies have been implemented in cities throughout Oregon (including Portland), as well as Palo Alto, California; Carmel, California; Cleveland; and Iowa City, Iowa. Palo Alto allows reductions of up to 50 percent in minimum parking requirements, provided that the difference is made up through a landscape reserve. None of the city's landscaped reserves have subsequently been required for parking.

To avoid confusion with terminology, it should be noted that land banking can also refer to the purchase of land by a local government or developer for use or resale at a later date. Banked land is sometimes used as interim parking to generate revenue generation—parking fees from temporary lots are put towards construction of later phases of the development, and at some point built over into buildings or structured parking.

Manage Demand

While reducing excess parking supply is important in eliminating the waste of unused parking spaces, some communities are looking to directly reduce the demand for parking, by providing people with readily available alternatives to driving. Demand reduction programs include car sharing, subsidies for transit, transit improvements, pedestrian and bicycle facilities, and comprehensive vehicle trip reduction programs that may include telecommuting and/or flexible work schedules to reduce commuting. While these programs are typically developed by local governments, their success often depends

on the commitment of businesses to implement them effectively.

Car-Sharing

Car-sharing is a neighborhood-based, short-term vehicle rental service that makes cars easily available to residents on a pay-per-use basis. Members have access to a common fleet of vehicles, parked throughout neighborhoods so they are within easy walking distance, or at transit stations. In programs with the most advanced technology, members simply reserve the nearest car via telephone or the Internet, walk to its reserved space, open the door using an electronic card, and drive off. They are billed at the end of the month, gaining most of the benefits of a private car without the costs and responsibilities of ownership, and without having to search for parking when their trip is over.

In urban neighborhoods with good transit access, car-sharing can eliminate the need to own a vehicle, particularly a second or third car that is driven less than 10,000 miles per year. In San Francisco, nearly 60 percent of households that owned vehicles before joining the car-sharing program have given up at least one of them within a year, and another 13 percent were considering it (Nelson\Nygaard, 2002). Zipcar, which operates in Boston, New York, and Washington, DC, reports that 15 percent of members sell their private car. In Europe, which has a far longer experience with car-sharing, each shared vehicle takes between four and ten private cars off the road -- and out of city parking spaces (City of Bremen, 2002).

In some cities, developers have been allowed to reduce the number of parking spaces if they incorporate car-sharing. Developers may need to contribute towards set-up costs and/or provide parking spaces reserved for car-sharing vehicles as part of a project. Car-sharing can be provided as part of a mitigation agreement with the local jurisdiction in return for a reduction in minimum parking requirements. Alternatively, the parking reduction can be codified through zoning ordinances, as is being considered in Portland, Oregon, San Francisco, and Seattle.

Car-Sharing, Pricing Strategies

Van Ness and Turk Development -- San Francisco, California

This development includes 141 residential units in a dense area of San Francisco, with only 51 parking spaces. The development was granted a substantial reduction in parking requirements—nearly two-thirds—from the city's minimum of 1 space per unit, to 1 space per 2.8 units. The reduction was granted in large part because of the developers' agreement to provide two parking spaces for car-sharing operator City CarShare, accessible to residents and all CarShare members. Strong community and organizational support, as well as proximity to major transit corridors, were also factors.

If the developers had been required to build the additional 90 spaces required by code, they would have been forced to add either subterranean levels or parking lifts, which save space by stacking vehicles on top of each other. These expensive options would have cost between $1.35 million for lift technology (estimated at $15,000 per space) or $8.1 million for additional below-grade parking levels (estimated at $60,000 to $90,000 per space).

The developer also "unbundled," parking costs, so that residents are charged for parking separately from rent. The current market rate for parking is $280 to $300 per space per month. By charging separately for parking and incurring lower construction costs, the developer is able to keep apartment rents lower.

Source: Thieophilos Developers, 2002.

Car-sharing can also be a useful tool to reduce parking demand in commercial developments. Employees can use a shared vehicle for meetings and errands during the workday, allowing them to take transit, carpool, walk, or bicycle to work. Car-sharing works best in compact, mixed-use neighborhoods, where firms with corporate memberships tend to use the vehicles during the day and residents can use them in the evenings and on weekends.

Formal car-sharing programs have been established in many cities, including Boston; Washington, DC; San Francisco; Oakland, California; Portland, Oregon; Seattle; and Boulder, Colorado, and are being established in many others. Some programs are run by non-profits with significant government support. Private for-profit companies, notably Flexcar and Zipcar, are operating in a number of cities, but they often work with the city or the local transit agency to secure reserved parking spaces on city streets or in transit park-and-ride lots. Alternatively, developers can provide shared vehicles themselves, or facilitate informal car-sharing among residents. Car-sharing reduces parking demand, but it also brings a broad range of other benefits, including fewer vehicle trips with less associated pollution, and improved mobility for low-income households who may not be able to afford to own a car, if rental rates are low enough..

Incentives for Transit

Financial incentives to ride transit can help reduce parking demand. They can be provided by employers, by cities, or by residential property managers.

Car-Sharing, Parking Maximums

Rich Sorro Commons -- San Francisco, California

Plans for Mission Bay, a 303-acre brownfield redevelopment area in San Francisco, include 6,000 units of housing, office space, university facilities, a hotel, community services, and retail. The city introduced parking maximums in this area to maximize the amount of new housing, make the most of the new Third Street Light Rail line through the neighborhood, and minimize traffic impacts on congested streets and the nearby freeway. Residential parking maximums were set at one space per unit.

One of the first projects completed was Rich Sorro Commons, a mixed-use project with 100 affordable units and approximately 10,000 square feet of ground floor retail. It was constructed with only 85 parking spaces, due to:

- Excellent proximity to light rail, commuter rail, and frequent bus service;
- Provision of two parking spaces for City CarShare; and
- Units below market rate, with tenants who are less likely to own a car.

With fewer parking spaces, Rich Sorro Commons was able to make space available for a childcare center and retail stores at ground level. The 17 would-be parking spaces were converted to retail space that is expected to generate revenues of $132,000 annually for the project (300 square feet per space at $25.80 per square foot in rent), making housing more affordable. The two City CarShare vehicles are available to residents, giving them access to a car without the costs of ownership – a particularly important benefit for low-income households.

Source: Kenneth Jones, Developer, 2002.

In the case of employer-paid transit pass plans, the employer pays the cost of employees' transit, often instead of providing a free parking space. This fringe benefit for employees reduces the demand for parking at the workplace, which in turn reduces traffic, air pollution, and energy consumption. It can equalize the transportation benefit that traditionally only went to employees who drove to work and received a free parking space. It also reduces costs, as transit benefits are generally less expensive to employers than providing parking. A transit pass in Los Angeles, for example, costs $42 per month, whereas the average cost for a parking space is $91 per month (Shoup, 1997b). To promote transit subsidies, the 1998 Transportation Equity Act for the 21st Century changed federal law so that transit benefits are not counted as payroll or as income (see also the description of cash-out programs on page 31). In some cases, city planners respond to employer-paid transit benefits by lowering minimum parking requirements. For example Montgomery County, Maryland's office zoning requirements allows a 15 percent reduction in minimum parking requirements if businesses offer reimbursed transit passes (Smith, 1983). The reduction in required parking can make urban development opportunities more inviting.

Transit incentives can also be useful for residential developments, or even for neighborhoods.. Property managers in Boulder, Colorado, and Santa Clara County, California, for example, can bulk-purchase transit passes for all their

Courtesy of City Car Share

residents at deeply discounted rates. The principle is similar to that of insurance—transit agencies can offer lower rates on passes because not all residents will actually use them regularly. Residents can take transit for free, meaning they are less likely to own a vehicle. Another benefit of prepaid transit programs is that they encourage residents to take transit spontaneously, since costs are paid up-front. A person does not have to commit to transit full-time in order to be able to reduce their demand for vehicle travel and parking. Developers who agree to fund transit passes can thus be rewarded with lower parking requirements.

Using Parking Revenue to Support Transit

Boulder, Colorado

Faced with a shortage of parking for customers, Boulder developed a program to encourage downtown employees to commute by other means. In 1993, Boulder's City Council mandated restricted downtown parking and appealed for parking demand management for the city's commuters.

The Central Area General Improvement District (CAGID), made up of many of downtown's 700 businesses, responded to the Boulder City Council's demands by creating a system using revenue from downtown parking meters to pay for free bus passes. The passes are provided for all of the district's 7,500 employees, and cost $500,000 each year The program has changed travel behavior, freeing up valuable customer parking spaces:

- Employee carpooling increased from 35 percent in 1993 to 47 percent in 1997.
- The district's employees require 850 fewer parking spaces.
- The increase in available parking has encouraged more retail customers to shop in downtown Boulder.

Boulder has created a special website with information about parking issues in the region: http://boulderparking.com.

The City of Boulder offers deeply discounted Eco-Passes to businesses outside the CAGID and to residents, and encourages walking and bicyccling. These programs mean Boulder employees avoid 212,500 single-occupancy vehicle trips per year, saving an estimated two million miles of pollution- and congestion-causing automobile trips. use is prevented each year.

Source : Boulder Community Network, 1999.

Transit Improvements

One of the best ways to reduce the demand for parking is to improve transit service so that it is frequent, convenient, and easy to use. Local government officials can improve public transit through major projects, such as adding light rail lines or streetcars, or creating systems that give buses priority at lights and intersections. They can also lengthen transit service hours, increase the frequency of bus and train service, and revitalize transit stations. Small improvements can also help, such as convenient SmartCard payment systems, improved bus stops and shelters, and real-time directional and schedule information systems. Portland, Oregon's MAX light rail system exemplifies the widespread benefits of transit improvements. The light rail system encourages transit-oriented development, decreases automobile commuting, and eases demand for parking. In fact, the light rail improvements eliminated the need for six downtown parking towers (EPA, 1998). These improvements are also partially responsible for $1.3 billion in new development in Portland over the last 10 years.

Pedestrian and Bicycle Facilities

Demand for parking can be reduced by providing pedestrian and bicycle facilities and amenities that make it easier and more pleasant for people to walk or bicycle to work, on errands, or to lunch. These changes can alleviate traffic congestion; for example, the automobile-dependent design of Tyson's Corner, Virginia, has resulted in high volumes of traffic at lunch time because

people cannot walk to restaurants or to run errands.

Promoting bicycling and walking can be accomplished through both comprehensive policies and simple changes to the street.. Some jurisdictions have adopted 'complete streets' policies that require every road construction or improvement project to provide safe access for everyone using the road, including transit users, bicyclists, and pedestrians (see www.completestreets.org). Other communities have focused on closing gaps in the sidewalk or bikeway network, by adding sections of sidewalks, bike lanes, or multi-use paths where needed to ensure safe travel by those modes.

In addition to paying attention to the street, bicycling and walking can be encouraged through design changes that make walking and bicycling more secure and pleasant. The Downtown Master Plan for Kendall, Florida (Miami-Dade County), discusses several design concepts to improve pedestrian and bicycle access. Some of the key elements promoted, but not required, by this program are listed in the text box to the right.

Developers can also encourage bicycling and walking by providing on-site facilities such as bicycle racks and even lockers and showers. For example, officials in Schaumburg, Illinois, a suburb of Chicago, have incorporated provisions into their zoning ordinance to encourage bicycle use. The ordinance requires all retail centers to have a minimum of 10 bicycle spaces located at each main building entrance. To increase awareness, the ordinance requires that bike racks be highly visible; to protect bicyclists, the ordinance requires bicycle parking areas to be separated from automobile parking. Other jurisdictions require covered, secure bicycle parking for employees who will be leaving their bicycles all day.

Designing for Pedestrians

Kendall, Florida

Close attention to design can dramatically improve the environment for pedestrians. The city of Kendall, Florida, has started to redevelop a conventional mall near a rail station into a new town center. The Downtown Master Plan specifies a number of improvements to create a compact, walkable place with good connections to existing neighborhoods:

- Bicycle/pedestrian access via new sidewalks and pathways.
- Trees and shrubs along edges facing streets and sidewalks.
- Parking hidden in the rear or in parking garages.
- Shade and rain protection for pedestrians, such as colonnades, arcades, marquees, second-floor balconies, wide awnings, or tree canopies.
- Buildings positioned along the sidewalks at a deliberate alignment, giving a designed shape to the public space.
- Doors and windows spaced at close intervals to generate activity, direct views to merchandise, and make walking interesting.
- Minimal number of driveways and parking lot entries that can making walking unsafe and erode urban space.

Source: Downtown Master Plan, Kendall, Florida, 1998.

Travel Demand Management (TDM) Programs

Travel demand management (TDM) programs combine several trip-reduction strategies to meet explicit travel goals. Some TDM programs are put into place by a single employer; others are managed by governments or business improvement districts and focus on a developed area that may include both businesses and homes. These programs typically attempt to decrease the number of trips by single-occupant vehicles, sometimes setting goals such as reduced vehicle trips or reduced miles traveled, while increasing the use of a variety of commuting and travel alternatives, including transit, carpooling, walking, and bicycling. TDM plans can be used by city planners to allow developers to build fewer parking spaces.

TDM programs may encourage transit incentives, parking cash-out, and other strategies mentioned here. In addition, these programs typically incorporate an assortment of complementary program elements that make it easier for people to give up solo driving. Examples include:

- "Guaranteed ride home" services that allow employees who use public transit to get a free ride home (usually via taxi) if they miss their bus or if they need to stay at work late.
- Company fleet cars that can be used for business meetings or running errands during the workday
- Preferential and/or reserved parking for vanpools/carpools.
- Carpooling and/or vanpooling with ride-matching service. Ride matching through informal "ride boards" or an employee transportation coordinator, helps people find and form carpools with neighbors.
- Cell phones for carpoolers to facilitate timing of pick-ups.

Shared Parking, Transit Improvements, TDM Program
Lindbergh City Center -- Atlanta, Georgia

The Lindbergh City Center is a mixed-use, high-density development in Atlanta on property owned by the transit agency, MARTA. The project was envisioned with a goal of having transit carry 30 percent of all trips to and from the center. The development, which includes a hotel and restaurant as well as office, retail, and residential space, centers on a MARTA light rail station that connects it to downtown Atlanta, the airport, and other areas. Parking reductions were allowed because of shared parking between office and retail uses, because of the ample transit access, and as a result of the Transportation Demand Management programs. Parking requirements for the first phase of the development were reduced by 20 percent overall; for office space the reduction is as high as 70 percent. Condominiums are allowed an 8 percent reduction, from 2 to 1.85 spaces per unit.

Source: Paul Vespermann, Lindbergh City Center, 2002.

Employers have little incentive to implement vehicle trip reduction programs if they are not granted reductions in minimum parking requirements. They would not be able to realize the potential cost savings from providing less parking, but would simply be faced with a large number of empty spaces. Some cities, such as South San Francisco (see box), have acknowledged this through ordinances that reduce parking requirements for projects that include vehicle trip reduction programs.

Pricing Strategies

Although parking is often provided at no charge to the user, it is never free. Each space in a parking structure can cost upwards of $2,500 per year in maintenance, operations, and the amortization of land and construction costs. Even on-street spaces incur maintenance costs and an opportunity cost in forgone land value. These costs end up hidden in rental fees and even in the costs of goods and services. Donald Shoup, Professor of Urban Planning at UCLA, has published extensively on parking policy in the United States. He believes that accurately pricing parking would solve many park-

ing problems (Shoup, 2005).

The cost of parking is generally subsumed into lease fees or sale prices. However, providing anything for free or at highly subsidized rates encourages overuse and means that more parking spaces have to be provided. Charging users for parking is a market-based approach that passes the true cost of parking to users, and encourages use of other transportation modes. If the fee charged to users of parking facilities is sufficient to cover construction, operation, and maintenance costs, it may encourage some users to seek alternative transport modes. Even where there are few alternatives to driving, parking pricing can encourage employees to seek out carpooling partners. In addition to reducing the cost of parking provision, pricing strategies bring substantial environmental and congestion benefits, particularly since they tend to reduce peak-period vehicle trips the most.

Travel Demand Management Ordinance

South San Francisco, California

South San Francisco is one of the few cities in the U.S. to enact a citywide Transportation Demand Management (TDM) ordinance, which allows reduced parking requirements for projects meeting TDM requirements. The ordinance applies to all nonresidential developments that expect to generate 100 or more average daily trips, or to projects seeking a floor area ratio (FAR) bonus. Parking reductions are not fixed, but are subject to case-by-case review and depend on the number and extent of TDM elements.

For example, the brownfield, mixed-use Bay West Cove development, which is located close to transit and bus service, was able to reduce required parking by 10 percent by implementing the following TDM strategies:

- Free parking for carpools and vanpools.
- Late-night taxi service and feeder shuttle service.
- Transit subsidy of $25 per month for all tenant employees.
- Late-night taxi service and feeder shuttle service.
- Guaranteed ride home program.
- Provision of a transportation coordinator.
- On-site project amenities such as child care, showers and lockers, electric vehicle charging, bicycle storage facilities, and a transit information kiosk.
- Parking charges of at least $20 per month for employee parking spaces.

Developers can use the savings from reduced parking construction and the income from paid parking to offset or cover the costs of implementing such programs.

Source: City of South San Francisco, 2003.

However, free parking is an ingrained American tradition. An estimated 99 percent (Shoup, 2005) of parking in the United States is free. How can paying for parking ever be a good thing for drivers? Drivers are willing to pay for parking that is more convenient and readily available. For example, on-street spaces near shopping destinations are much more likely to be available to customers if priced and regulated to prioritize short stays -- if they are free, they will be used for all-day parking by employees or residents. For residents, separating the cost of parking from the cost of rent or a mortgage provides an economic benefit to those who choose to own fewer cars. In addition, the revenue generating from putting an accurate value on parking can be used to benefit an entire neighborhood.

For commuters, making the cost of parking part of the decision on how to get to work encourages transit use and other alternatives, reducing traffic congestion. Parking charges have been found to reduce employee vehicle trips, and thus daily parking demand, by between 7 percent and 30 percent

or more, depending on factors such as the level of charges and the availability of alternatives to driving alone. One researcher has calculated that each 1 percent rise in parking fees is accompanied by a 0.3 percent decrease in demand (Pratt, 2000).

Cities and developers are using a variety of pricing strategies to better balance parking demand and supply. They include parking cash-out programs, pricing that prioritizes certain types of trips, residential parking plans, and parking benefit districts.

Cash-Out Programs

Cash-out programs allow employees to choose a transportation benefit, rather than simply accepting the traditional free parking space. Under such programs, employers offer employees the choice of:

- Free or subsidized parking,
- A transit or vanpool subsidy equal to the value of the parking (of which up to $100 per month is tax-free under current federal law), or
- A taxable payment approximately equal to the value of the parking, essentially cash to commuters who bicycle or walk to work.

Employees who opt for the non-parking subsidies are not eligible to receive free parking from the employer and are responsible for their parking charges on days when they drive to work. The cost savings for employers

associated with cash-out payments depend on the amount of the payments. If the full cash equivalent is provided, this demand reduction program does not reduce the total costs of providing parking. However, employees may accept cash payments lower than the full equivalent of the parking subsidy. If partial cash payments are used, employers face lower overall transportation subsidy costs, and employees still benefit. The programs help end the inequity of providing a free parking space benefit to drivers, while offering nothing to those who choose to arrive via transit, foot, or bicycle.

Cash-out programs are often easier to implement than direct charges, as they are generally more acceptable to employees, particularly when free parking had been the norm. However, their impact on travel behavior is usually lower, due to the administrative burden on employees, inertia in changing travel habits, and the fact that cash-out payments can be a taxable benefit whereas free parking is not.

Cash-out programs provide significant environmental, social, and economic benefits. For example, in response to California's mandatory cash-out requirement, eight firms reported an average 17 percent reduction in the total number of solo drivers (Shoup, 1997a). Thus, another benefit of cash-out programs is a reduction in traffic congestion and associated pollution.

Cash-Out Program

Santa Monica, California

In 1992, California instituted a mandatory cash-out program. The California Health and Safety Code Section 43834 reads, "'Parking cash-out program' means an employer-funded program under which an employer offers to provide a cash allowance to an employee equivalent to the parking subsidy that the employer would otherwise pay to provide the employee with a parking space."

The effects of the cash-out program on transportation use in Santa Monica have been significant. A study conducted by Donald Shoup of the UCLA found that for two Santa Monica employers, the share of solo commuters decreased by between 7 and 8 percent once the cash-out program was in place. This reduction in solo commuters is responsible for a decrease in annual commuting of 858 vehicle miles (Shoup, 1997a).

Prioritizing Trips

Parking pricing can be a tool to prioritize some types of trips over others, according to their purpose and duration. It allows managers to cater to certain users, such as short-term shoppers, while discouraging other users, such as commuters, who add to peak-hour congestion and occupy a parking space for an entire day. These pricing strategies allow the overall supply of parking to be minimized, while ensuring spaces are available for critical users. They can also alleviate pressure to provide more parking from retailers and businesses, who may be concerned that lack of parking discourages shoppers. For example:

- Low prices for short-term parking encourages shopping trips, and limiting the duration of parking can also support these high-turnover trips. For example, charging $0.25 per hour with a two-hour maximum will allow many people to use a single space over the course of a day. The same space priced at $2.50 for up to ten hours will likely serve a single commuter. The parking revenue might be the same, but the sales for businesses and sales tax for the city will likely be much higher with short-term parking.

- Parking charges that are levied by the hour or day, with no discounts for monthly parking, remove the incentive to drive every day to "get your money's worth" from the monthly parking pass.
- Parking charges at transit stations that only apply before a certain time (such as 9:00 am) encourage users to ride transit when it is less crowded, rather than contributing to crowding in the peak.
- Sophisticated new parking meters can charge visitors a different rate than residents or employees with parking permits, preserving parking for regular users while maximizing revenue from occasional users.

Residential Parking Pricing

Parking charges can also be introduced at residential developments, through separating or "unbundling" the cost of parking from rents or sale prices. Rather than being provided with a set number of spaces whether they need them or not, residents can choose how many spaces they wish to purchase or rent. An alternative to direct charges is to provide "rent rebates" or discounts to residents who own fewer vehicles and do not use their allocated parking spaces.

In many urban areas with limited off-street parking, curb parking is reserved for residents through residential parking permit programs. In most cases these programs give residents free or very inexpensive curb parking permits and prohibit anyone else from parking there. However, this can leave many spaces unused during the day when nearby businesses could use extra parking. A few communities, including Aspen Colorado and Tucson Arizona, are experimenting with allowing businesses to buy permits in these areas at very high rates, or are charging hourly parking fees (Shoup, 2005). The revenue generated can be used to benefit the neighborhood, in one version of a parking benefit district, as described below.

Parking Benefit Districts

The revenue from parking can be used to directly benefit the street or the

neighborhood where the money is collected. Parking benefit districts receive the revenue from meters and residential permits within the district. Once administrative costs are covered, all money goes to transportation and neighborhood improvements such as undergrounding of utility wires (Shoup, 1995), regular street and sidewalk cleaning, installation of benches, nice lighting, or other amenities. Parking benefit districts can allow new development to use available on-street and other spaces, while addressing potential capacity problems through market pricing of curb and off-street parking. Earmarking revenue to directly benefit the neighborhood or commercial district helps to generate support for charges from local residents and businesses, who might otherwise resist paying for parking that used to be free. Often, local residents or businesses have a say in how the newly available revenue will be spent.

The most common use of Parking Benefit Districts has been in downtown business districts, usually using parking meter revenue. Cities such as San Diego and Pasadena, California, have implemented such districts. The concept also applies to residential areas. Most residential parking permit programs give residents free or very inexpensive curb parking permits and prohibit anyone else from parking there. However, this can leave many spaces unused during the day when nearby businesses could use extra parking, and neighborhoods could certainly use the revenue that could be generated by charging for street parking.. A few communities, including Aspen Colorado and Tucson Arizona, are experimenting with allowing businesses to buy permits in these areas at very high rates, or are charging hourly parking fees (Shoup, 2005). Furthermore, this concept can be refined based on the neighborhood. For example, a neighborhood adjacent to an institution such as a hospital or university might implement a two-tiered residential permit program. Residents could buy permits at one rate, while excess on-street capacity would be sold at market value to non-residents.

Case Studies

This section presents case studies that illustrate how specific metropolitan areas have benefited from innovative parking alternatives. Little data has been collected comparing the effectivness of various parking strategies, and much cost data is proprietary and not available for analysis. Therefore, these examples are presented to illustrate the ways that parking strategies are being used in real-word settings to help communities balance parking and other goals.

- Portland, Oregon: Parking policies include maximums, location- and use-specific requirements, shared parking entitlements, car-sharing, and vehicle trip reduction or Transportation Demand Management (TDM) measures. The Hilton Hotel and the Buckman Heights and Buckman Terrace apartments have used these policies to alter their parking mix..
- Arlington County, Virginia: Location- and use-specific standards and vehicle trip reduction strategies were used to reduce parking requirements in two developments, the Market Common and the 1801 North Lynn Street commercial development.
- NASA Research Park, Santa Clara County, California: A large mixed-use development illustrates vehicle trip reduction strategies
- The Shoppes of Wilton Manors, Wilton Manors, Florida: This case illustrates how shared parking arrangements can be used to reduce parking requirements for a mixed-use redevelopment in one of the fastest growing areas of the country.
- SAFECO Insurance Company Expansion, Redmond, Washington: SAFECO responded to the state's transportation demand management requirements with an effective vehicle trip reduction program.
- The D'Orsay Hotel, Long Beach, California: This case illustrates how a downtown parking management plan that allows shared parking and in lieu parking fees can reduce development costs and put scarce land to productive use.

These six case studies were chosen to highlight the range and depth of parking alternatives, including those created for a specific development basis and those written into code. The case studies include some description of

outcomes, including parking costs and development decisions; support for compact, mixed-use, walkable communities; and other goals. As city and county jurisdictions, Portland and Arlington have innovative approaches to managing their transportation systems, including parking, and the case studies illustrate how these policies affect specific developments.. Arlington County is an example of code-based parking reduction strategies—it encourages reduced parking primarily through lowered minimum requirements. Portland, on the other hand, has a varied toolbox of strategies to offer developers to reduce parking. In other cases, specific developments took the initiative to go against development trends in reducing parking.to achieve broader goals, such as the NASA development in California. For the Wilton Manors (Florida) and D'Orsay Hotel (California) cases, the lowered cost associated with parking alternatives was a key element that allowed the projects to be built in a way that satisfied multiple goals of the community and developers. The parking alternatives can also provide directly documentable environmental benefits: SAFECO's use of transportation management measures and development design, limited air emissions associated with automobile commuting and protected water quality. Parking alternatives used for The Shoppes of Wilton Manors and D'Orsay Hotel developments facilitated these infill projects, thus preventing additional sprawl and the associated air and water quality impacts.

Innovative Parking Policies: Portland, Oregon

Portland, Oregon, has introduced several innovative planning policies (listed in the box on this page) to balance transportation needs with environmental protection, community design, affordable housing, and other goals. The two developments profiled below are just a sample of the numerous projects that have taken advantage of the city's parking reduction policies to achieve economic, environmental, and social benefits. Others, in brief, include:

Innovative Parking Policies
Portland, Oregon

Portland has adopted a range of parking policies to promote infill development and balance driving and alternatives to the private car, including:

- No minimum parking requirements in the central city;
- Parking maximums in most neighborhoods, including downtown;
- Transferable parking rights in areas with parking maximums;
- Reductions from typical minimum requirements for car-sharing vehicles;
- Reductions from typical minimum requirements for vehicle trip reduction strategies, such as transit access and bicycle parking;
- Context-specific standards; and
- Provisions for shared parking.

■ Stadium Station Apartments: 115 affordable apartments, with parking at 0.6 spaces per unit. Of the 40 units already leased, only one-third of households own automobiles. Despite already low parking ratios, 50 percent of the parking remains unused at full occupancy.

■ Orenco Station and La Salle Apartments: Both have parking reductions to 1.8 spaces per unit and provide transit pass allowances to residents. This has achieved a large increase in

transit ridership among occupants.

- Collins Circle, Center Commons, and Russellville Commons Apartments: each is able to serve residents with a combination of transit access, walkability, and fewer than one parking space per unit

Hilton Hotel

The Hilton Executive Tower Hotel and garage, developed by Melvin Mark Companies, is in the heart of the Portland downtown business district, within the Free Transit Zone. Constructed on a block that was the former home to the Greyhound bus terminal, the 20-story, 440,000-square-foot project consists of 312 hotel rooms, conference space, 20,000 square feet of ground-floor retail, and 680 parking spaces. The Hilton Hotel is the owner of the hotel portion of the project, and a Melvin Mark partnership owns the parking structure. Under the Portland zoning code, the maximum allowed parking for the development would have been 380 spaces—312 hotel spaces, plus 68 growth spaces for the retail.

The developers recognized that unmet demand for parking existed in Portland, but not primarily from hotel visitors. They sought to make the new parking available to other users, which would make it more efficiently used (and profitable) than if it were restricted to hotel use. They were able to accommodate needs of the new development and surrounding uses by building 680 spaces — more parking than downtown Portland parking maximums allow. This case study illustrates not only the benefits of shared parking, but that parking maximums combined with transferable parking entitlements can increase the value of real estate and development.

Under the Portland zoning code, the maximum allowed parking for the development would have been 380 spaces—312 hotel spaces, plus 68 growth spaces for the retail. These maximums are lower than both the parking generation rates published by the Institute of Transportation Engineers, and the *minimums* adopted by most cities. The maximums for new office and retail development downtown are one space per 1,000 square feet; for hotels, the maximum is one space per room.

The city views the parking maximum as an “entitlement.” New developments can either build the parking “entitlement” (the maximum parking allowed) or can transfer those spaces to another development, as long as the transfer contract is signed before the foundation is laid. Buildings that choose not to build the parking they are entitled to, or historic buildings constructed before parking became an issue, are granted an entitlement of 0.7 spaces per 1,000 square feet—70 percent of the parking entitled to new construction—which they can transfer to other developments at any time. Transferred rights are generally not sold, but are granted under certain rules that allow the project delivering the parking rights to reserve use of some of the spaces -- but at market rates paid to the development that built the parking.

In addition to parking limits, the city also has created three different types of parking spaces applicable to the Hilton Hotel development:

- **Hotel spaces**: By code, these spaces may only be sold to hotel users (guests or visitors) between the hours of 7:00 a.m. and 6:00 p.m., weekdays. If the hotel is in a slow season, or if not all hotel visitors want parking, the remaining parking spaces go unused—a potential financial liability.
- **Growth spaces**: These are the spaces entitled to new development. They have no constraints and can be sold however the developer sees fit.
- **Preservation spaces**: These are spaces generally entitled to older and historic buildings that were constructed without parking. They are more restrictive than growth spaces; if they are not used by building occupants, they can only be sold to other cash users on a daily or hourly basis.

Courtesy of Melvin Mark Companies

The Hilton project combined these two policies -- the transferable rights and the categorization of parking spaces -- to build enough spaces to serve both the hotel and surrounding developments. The spaces built include:

- 100 hotel spaces allowed under the zoning code, but restricted to use by hotel visitors (only 30 percent of their entitlement in this category).
- 68 growth spaces allowed for the retail space under the zoning code (100 percent of their entitlement).
- 512 spaces by transferring the parking entitlement from nearby buildings and new projects:
- 200 growth spaces transferred from a concurrent project, the 250,000 -square-foot Pioneer Place mall. The project wanted the parking to attract customers, but did not want to assume development costs or lose retail density on the site to parking.
- 312 preservation spaces transferred from seven buildings in the area. Most of these were office buildings built at a time when parking was not included.

Transferable parking rights made the Hilton/Melvin Mark development financially beneficial to all parties involved. The Hilton project would not have been feasible had its developers not been able to get the additional parking spaces and the flexibility to manage parking. As a major revenue component, the transfer of parking entitlements allowed the developers to secure funding from lenders. Prior to development, they were able to sell 500 monthly parking passes to managers of the buildings from which they had obtained

preservation space rights. Like pre-leasing an office building, this committed revenue helped in obtaining financing. The additional parking and more flexible preservation and growth parking spaces also reduced risk and seasonal fluctuations that the code's "hotel use" parking constraints present. The garage operates with day-to-day averages of 85 to 90 percent occupancy from being able to sell to many different users—a major source of revenue for the project.

Transferable parking entitlements retains the advantages of maximum parking requirements, such as reduced vehicle trips and reduced land area devoted to parking, while creating flexibility and a potential for profit that attracts major developments to the area. In this way, transferable parking entitlements help to reinforce the economic health of the central city, and important goal in the Portland region. Downtown development ensures that the city of Portland retains its property tax base, promotes an active and pedestrian-friendly downtown with multiple amenities, and produces more foot traffic for surrounding businesses. Pioneer Place mall, for example, attracts more customers by having available parking at an adjacent site, without adding the risk of developing parking or losing retail space on their property.

Portland Hilton Executive Tower

Profile:

- Hotel, conference center, retail, parking garage
- 312 hotel rooms
- 20,000 square feet retail
- 680 shared parking spaces – 45% more than typically allowed under parking maximums

Strategies:

- Transferable parking entitlements
- Parking maximums
- Shared parking

Benefits:

- Increased parking revenue helped attract major downtown development
- New parking benefit provided for older downtown buildings without their own garages
- Shared use reduced impact of extra, empty parking spaces

The preservation buildings that transferred their spaces to Melvin Mark Companies also reap significant financial benefit. Typically older, commercial buildings are at a market disadvantage for leasing space because they cannot provide or commit parking for their tenants in office leases. With parking built at the Hilton/Melvin Mark garage and preferential rights to lease to their tenants, the older buildings compete on a more level playing field with newer buildings for prospective tenants.

Buckman Heights and Buckman Terrace

Located adjacent to Portland's central city Lloyd District and along the edge of a light-industrial area, the site of the Buckman Heights mixed-use development and the Buckman Terrace Apartments was used for decades as a car dealership. Despite a heated real estate market, the 3.7-acre site had been on sale for well over a year, unattractive to most developers. Prendergast & Associates saw an opportunity to build housing on the site, given its prime location—the project is located nine blocks from light rail, within five blocks of four high-frequency bus lines, and surrounded by a growing network of bike lanes and routes. It is also within easy walking distance of jobs in the Lloyd District, the Central Eastside, and downtown. In part because of Portland's parking policies, Prendergast was able to purchase the site in 1997,

Courtesy of Pendergast & Associates, Inc.

sell the dealership building to a retail user, and convert the remaining 2.5 acres of vacant parking lots into sites for 274 units of housing—an 8-unit townhouse project, a 144-unit mixed-income apartment building, and a 122-unit apartment building with a small retail space. Creative parking strategies helped to keep development costs low.

Buckman Heights Apartments and Buckman Terrace

Profile:

- Mixed market-rate and affordable housing with modest retail
- 144 units and 122 units, respectively
- Parking ratios of 0.4 and 0.57 spaces per unit, respectively

Strategies:

- Parking maximums
- Use of on-street parking
- Shared off-site parking
- Car-sharing and bicycle parking available
- Parking charges separated from rents

Benefits:

- Lowered parking ratios increase affordability: 40% of Buckman Heights units are affordable
- Elminating excess parking saved Buckman Terrace developers at least $875,000
- Eliminating excess parking made room for more affordable units
- Residents benefit from affordable transportation options: bicycle facilities are well used

The city of Portland has very low minimum parking requirements in the area. Zoned for general employment, with housing allowed but not actively encouraged, the minimum parking requirements were just 0.5 spaces per unit—already a significant reduction from the typical urban standards of between one and two spaces per apartment. This neighborhood is close to transit and jobs, providing consumers with a choice of different housing types and mobility options.

Both developments have extremely low parking ratios. Buckman Heights has 58 on-site parking spaces for a ratio of 0.4 spaces per unit. Buckman Terrace has 70 spaces at a ratio of 0.57 spaces per unit, with only on-street parking for the retail. These spaces are a mix of carport, surface, and at-grade structure spaces.

The developmenter was able to both reduce the parking required and keep parking demand lower than supply through the following strategies:

- **Bicycle Facilities:** Buckman Heights Apartments eliminated 14 required on-site parking spaces by providing 56 secure, covered bicycle parking spaces in addition to the 36 spaces required by code. Portland zoning provision allows four covered, secure bike parking spaces to be substituted for one automobile parking space, up to a maximum of 25 percent of the required parking. The developer also provided lockers, floor pumps, and a workstand in the bike rooms. The bicycle parking has been so well used that the developer added even more bike parking to Buckman Terrace.

- **On-street parking:** The Buckman Heights development included restriping a wide street between the two apartment buildings to accommodate angled parking, increasing the supply of on-street spaces as well as creating a more pedestrian-friendly feel through the addition of generous sidewalks, landscaping, and street lamps. Although this did not directly replace the requirement for off-street spaces in this case, it provided a buffer and allowed the development to build as little parking as possible.

- **Shared off-site parking:** The development made use of on-street parking in the adjacent area where a sewing/assembly plant and a high school were located. The adjacent uses had huge on-street

parking demand during the day (when residents are typically at work) but were empty on evenings and weekends (when residents are typically home and parking their cars). This unique setting allowed the developer and the lenders to feel comfortable with the sharply reduced on-site parking ratios.

- **Unbundled Parking Costs:** Paying for parking separately from rent helps keep residents aware of parking costs and allows them to make informed, economic choices about vehicle ownership and other transportation options. Parking at Buckman Heights costs between $15 and $30 per month, depending on surface or covered spaces. Buckman Terrace parking (structured) costs $50 per month.
- **Car Sharing:** FlexCar (originally CarSharing Portland) now has two vehicles at the complex. Since car-sharing was not available at the time of construction, it did not reduce the amount of parking that had to be built, but it now reduces the need for residents to own cars and, consequently, the demand for parking.

Keeping development costs low was particularly important because the project was not eligible for property tax abatements that are given to low-income and central city market-rate housing, because it lies just outside the central city boundary. By cutting costs, partially from parking, the developers were able to secure the funding needed for development.

Considering per space construction costs in Portland of $5,000 to $7,000 for surface parking, upwards of $15,000 for surface structures, and $25,000 to $30,000 for below-grade structures, parking reductions in the Buckman developments significantly reduced development costs. Buckman Terrace was constructed with no surplus land, so additional parking would have been forced to go underground. By forgoing the construction of 50 additional spaces, the developers were able to reduce the cost of the apartments with the savings of between $875,000 and $1,125,000. For Buckman Heights Apartments, the developers were able to add additional apartments to the project using the money saved from parking, especially helpful for revenue given rent restrictions on the affordable units.

The attention to a walkable environment has given the residents more transportation choices and improved their quality of life, while also making the project marketable. Both developments have been at or near full occupancy (95 to 100 percent leased) since the openings in 1999 and 2000, even outper-

Courtesy of Pendergast & Associates, Inc.

forming the soft Portland housing market in recent months. The developments have provided more than 80 new affordable homes. In addition, charging for parking separately from rent benefits households who do not have cars—particularly low-income families. Infill housing also increases the city's tax base.

Context-Specific Requirements and TDM: Arlington County, Virginia

Arlington County is an urban area of about 26 square miles directly across the Potomac River from Washington, DC. Arlington County has adopted countywide development standards and guidelines, including lower parking ratios, to support future growth of high-density commercial and residential development around Metrorail stations in their two corridors—the Rosslyn-Ballston Corridor and the Jefferson Davis Corridor. Two specific projects are profiled here—a high-density residential development and a commercial development. Both have used the county's context-specific parking requirements and travel demand management program to better match parking supply with demand, making resources available for other community benefits.

Context-Specific Requirements
Arlington, Virginia

Commercial Uses:
- Commercial Office Zoning area outside of station areas: one space per 530 square feet.
- Commercial Redevelopment Zone (along Metro Corridor): one space per 580 square feet.
- Rosslyn-Ballston Metro Corridor Development and developments within one-quarter mile of a Metro station: one space per 1,000 square feet.

Retail Uses:
- For retail and service-commercial uses within 1,500 feet of a Metro station, no parking is required for the first 5,000 square feet of gross floor area.
- Any square footage above that has the same parking requirements as commercial in the area (either 1:580 square feet or 1:1,000 square feet, depending on its location in the corridor).

Residential Uses:
- High-density residential: 1.08 spaces per unit (1:1 + visitor).
- Townhouses: 2.2 per unit (2:1 + visitor).
- Single family homes: one space per house. This ratio assumes space in a driveway or on the street.

Arlington County dictates minimum parking requirements based primarily on distance from Metro stations. Parking requirements for commercial development are particularly transit-sensitive, with the lowest ratios for properties closest to Metro stations. According to Richard Best from the county Public Works Planning Division, if a development is within one-quarter mile of a Metro station, the county is open to allowing development with no new on-site parking, although this is not specifically written in the code.

Every project that goes through the site plan process for development along Metro corridors is required to have a transportation plan, which varies depending on density and use. Further reductions in minimum parking requirements, beyond the location- and use-specific standards, are granted for projects that include robust transportation choices, such as free or discounted transit passes for employees, other transit subsidies, ridesharing, and information on transit.

While not written into code, Arlington also enforces urban design criteria in parking construction. All parking is encouraged to be below ground, or if at surface level, it must be in a structure that is wrapped with occupiable ground floor space, in order to

reduce the impact of the parking on the walkability of the street. There are no codes dictating such design, but a site-plan review process strongly encourages it.

Courtesy of McCaffery Interests

The Market Common

The Market Common in Clarendon is a mixed-use development with retail and restaurant space, 300 market-rate apartment units on upper floors, and adjacent office space. Located three blocks from two Metro stations along the Rosslyn-Ballston corridor, and in close proximity to dense employment and retail, the area has a variety of uses and urban form that supports walking, transit, and biking as well as driving and parking. Realizing that patrons of retail establishments would be using the parking during the day while residents would mainly need parking at night, developers of the Market Common devised a shared parking strategy.

Courtesy of McCaffery Interests

Under typical suburban parking requirements, the development would have required over 2,000 parking spaces.Under the Arlington County Code, the project would have required 1,504 spaces for the retail, housing, and office space. But by using a shared parking strategy, the development was able to reduce the requirement by 25 percent—to 1,160 spaces. The Market Common is the first recent development approved in the county with no assigned spaces for residential units—all spaces are equally available for all uses.

Parking demand is mitigated through several strategies:

- Parking costs are unbundled from rent for residents: $25 per month for the first car, $75 to $100 per month for the second;
- Daily parking is variable for other users, with rates of $1 to $4 per hour, with higher rates for longer stays;
- Bicycle parking reduces demand, as does proximity to transit.

Perhaps the parking could have been reduced even more and still met demand. Studies of parking use at Market Common indicate that up to 20 percent of available parking remains unused at peak times. The developer and county agreed to count that surplus parking toward requirements at future phases of this development.

The Market Common

Profile:
- 225,000 square feet of retail and restaurant use
- 300 market-rate apartment units
- Parking: 25 percent reduction from county code

Strategies:
- Shared parking
- Parking costs separated from rents
- Transit and bicycle facilities

Benefits:
- Fewer required spaced reduced development costs by an estimated $16 million
- Parking paid for only by those who use it

1801 North Lynn Street

The 1801 North Lynn Street development is a new commercial building in the Rosslyn Metrorail station area, zoned for parking requirements of one space per 1,000 square feet, dependent upon the choices available to travelers. The zoning in this area permits increases in density and height when the County Board finds that the development offers important community benefits. The 1801 North Lynn Street development has 347,295 square feet of office space, 6,065 square feet of retail, and 386 parking spaces. At typical suburban parking ratios, that amount of development would have been accompanied by roughly three times as many parking spaces. Transportation Demand Management strategies allowed parking to be reduced to one space per 1,000 square feet ratio. The transportation program included the following elements:

1801 North Lynn Street

Profile:
- Office building with street-level retail
- 348,000 square feet of office space
- 6,000 square feet of retail space
- 386 parking spaces, one-third of typical requirements

Strategies:
- Extensive TDM program including fare subsidies
- Bicycle, pedestrian, and transit facilities

Benefits:
- Employees have a range of commuting choices
- Eliminating unnecessary parking helped make project financially feasible
- Increased tax base from new commercial activity

- Full-time, on-site Employee Transportation Coordinator to manage the program;
- Financial contribution to the Rosslyn Commuter Store;
- Transit fare subsidies for employees;
- Implementation of several ridesharing and parking strategies, including promoting ridesharing, helping commuters find rides, and subsidizing parking for carpools and off-peak commuting; and
- Bike facilities and showers to encourage bicycle commuting.

For workers in this building, the discounted Metro fare, along with walking and biking access to many residential neighborhoods, provides real choices in how to get to work. For shoppers at its retail establishments, newly available on-street parking in front of the stores provides a better option than existed before. The county gets an increased tax base and the vitality of mixed-use development and street-level retail in an area that in the past has not enjoyed off-peak activity.

Financial benefits to the developers of the two Arlington County projects are obvious -- reduced parking requirements sharply reduce construction costs, which in Arlington can mean upwards of $15,000 per space for structured parking, and up to $25,000 or more for below-grade spaces. Building less parking is a major part of making the projects financially feasible, in terms of balancing land costs, construction costs, revenue, and

lending. The Market Commons project, for example, saved $16 million from the 400 forgone parking spaces, without which it would not have been a feasible project.

Arlington has succeeded in promoting high-density, mixed-use developments with reduced parking in its Metrorail corridors. This kind of design promotes walk and bike trips as people can go from home to work and shopping in very short distances. Urban design in both projects pays close attention to pedestrian comfort, by providing usable public space, circulation paths, attractive landscaping, and engaging street-level architecture.

Transportation Management for Mixed-Use Development: Santa Clara, California NASA Research Park

The NASA Ames Research Center (ARC) is a 1,500-acre site of federally owned land that lies between the southwestern edge of the San Francisco Bay and Silicon Valley, in Santa Clara County, California. Part of the site includes Moffet field, a decommissioned military site. Years of planning and community input led to an award-winning plan for a mixed-use development including an emphasis on research and technology firms; Internet-search giant Google recently announced it would build a major campus at the site. Design and construction will continue through at least 2014.

The majority of redevelopment on NASA's land will occur in the NASA Research Park (NRP), a 213-acre parcel on the southwest part of the site. Plans for development include the restoration of existing historical buildings, as well as adding nearly two million square feet of educational, office, research and development, museum, conference center, housing, and retail space. Also being developed as part of the project is 28 acres of a 95-acre parcel on the north side of the site called "The Bay View." This area is slated for predominantly housing uses, in addition to supporting retail, childcare, and other services. The remainder of Bay View will remain as open space and natural habitat.

Because the NASA land is federally owned, it is exempt from city or county codes that dictate parking requirements, as well as other development restrictions. Despite the lack of restrictions, the NRP project sought from the beginning to reduce the impact of traffic on surrounding streets and neighborhoods—with the goal of keeping driving at least 32 percent below the typical rates by Santa Clara County residents.

Had the site been developed using typical minimum parking ratios, it would have needed 7,542 parking spaces. Instead, the TDM plan calls for 5,200 spaces, with parking ratios determined by the actual number of people expected to be on-site.

A TDM plan was developed for the NRP and Bay View, using a range of trip reduction strategies to ensure that parking demand can be accommodated in fewer spaces The TDM plan will be binding on partners and other tenants at the NRP and Bay View developments, pursuant to the provisions of the environmental permits.

Some of the many innovative TDM strategies to achieve the plan's goals include:

- Supportive site design, including housing, retail, and office space in close proximity; bicycle paths and bike parking; a network of sidewalks and paths;
- Oh-site employees and students get priority for purchasing on-site homes
- Site-wide shuttle bus program and bus pass;
- Partners, lessees, & tenants are required to pass on the cost of parking or offer parking cash-out;
- Parking fees structured so the less you park, the less you pay: o discount for monthly parking; hourly spaces; low rates for carpoolers
- 75 percent of all spaces shared between land uses.

The TDM plan allows for adjusting the price of parking to balance demand with supply. This flexibility provides revenue for TDM programming while ensuring efficient use of the parking. The TDM program means significant cost savings for developers, while reducing the environmental impact and improving the pedestrian environment of the future campus.

Without the TDM program, the development would have needed an additional 2,342 parking spaces, at a cost of about $3 million annually. Parking fees cover all costs of providing parking and the TDM program, a benefit to both the developer and surrounding communities: The TDM program requires that those who park pay for the parking supply. Travelers who want to drive can park, while travelers who choose not to drive do not have to pay for it.

The land itself is a brownfield—formerly contaminated by its military use—as well as an environmentally sensitive habitat—home to the burrowing owl, a California species of special concern. The development focuses on remediation, preservation, and environmental sustainability. The development plan

NASA Research Park and Bay View

Profile:

- Partially redeveloped 1500-acre former military base with significant open space
- 1,120 town home apartments for 3,300 residents
- 810 dormitory-style housing units for 1,560 students
- Renovation of 600,000 square feet of historic buildings
- Addition of more than three million square feet of new housing, office, and retail space
- 5,200 parking spaces, 32 percent less than typical development codes require

Strategies:

- Mix uses to reduce vehicle trips
- Bicycle and pedestrian facilities and shuttle bus
- Parking pricing policies
- Specific TDM goals for commuting trips, including 32 percent fewer vehicle trips than area average

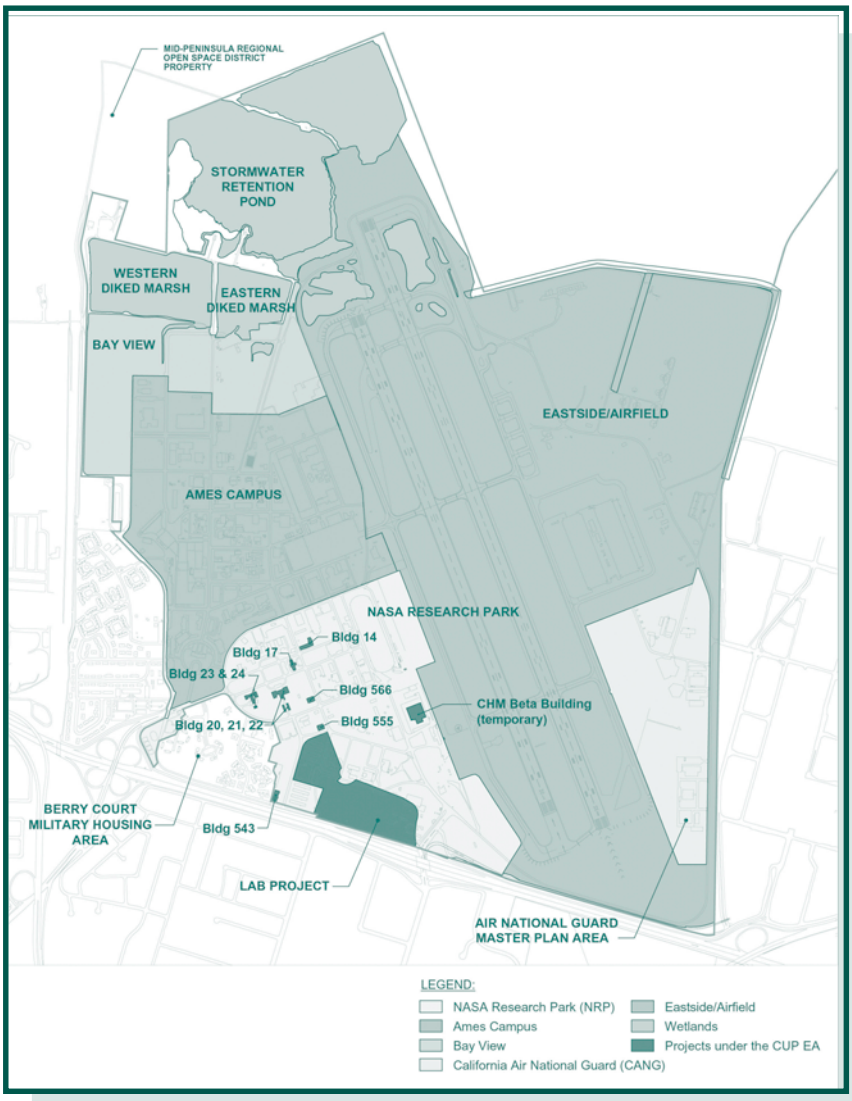
Benefits:

- Reduced traffic impact on surrounding communities
- Less pavement reduces impact on natural habitat
- Convenient housing and commuting options for residents and employees
- Reducing unnecessary parking saves $3 million annually

goes a step further to ensure conservation for a sustainable future—it incorporates energy efficiency, water conservation, transportation demand management, and seismic safety. This is a striking change from typical development patterns in the area.

The NRP TDM plan will reduce impervious pavement, an element of development that can damage nearby ecosystems because of reduced habitat, limited rainwater re-absorption, and increased polluted stormwater runoff. Reduced parking in the NRP saves land, which contributes to the project's 81 acres of preserved land for the endangered burrowing owl.

By combining uses on the property and offering on-site employees and students priority for purchasing homes, the development will not only reduce the need for people to commute from out of the region, but will sharply reduce internal vehicle trips. The development will be home to nearly 5,000 people, at least half of whom will work or study on the campus. These employees will be able to find services on site, instead of having to run errands off site on their lunch breaks. NASA has committed to offering a minimum of 10 percent of the homes on site at prices affordable to its employees. The reduced parking is not an end in itself. It underscores the emphasis on better urban design and improved walkability, improving the quality of life of residents,



employees, students, and visitors.

Reduced Parking Requirements: Wilton Manors, Florida The Shoppes of Wilton Manors

In the city of Wilton Manors, in Broward County, parking reductions were partly responsible for enabling a financially deteriorating neighborhood shopping center to be redeveloped into a successful mixed-use development, featuring restaurants, art galleries, and other entertainment uses, as well as professional offices. At its peak in the 1960s, the shopping center housed a Grand Union supermarket, a bank, a fast food restaurant, and many other stores. In the 1990s, the shopping center lost several businesses, reducing the tenant occupancy rate to 30 percent.

The Shoppes of Wilton Manors

Profile:
- Redevelopment of neighborhood shopping center
- Converted to an entertainment destination
- Eliminated construction of 390 unnecessary parking spaces

Strategies:
- Zoning overlay district recognizes lower demand for parking
- Off-site shared parking facilities

Benefits:
- Buildings preserved for rental, rather than demolished for parking
- Saved $1.9 million in construction costs
- Increased property values and city revenues
- Helped inspire nearby redevelopment

Southeast Florida, comprising Palm Beach, Broward, and Dade Counties, is one of the fastest growing regions of the United States. Projections for 2015 suggest that the population will reach 6.2 million people, an increase of over 50 percent from 1990. With the growing population and increasing development, fragile ecosystems are being lost and water supplies threatened. Communities and this region are seeking to reverse these trends by developing compact, mixed-use, walkable places. Reducing parking requirements is one element of southeast Florida's move toward smart growth and development.

To accommodate redevelopment of the shopping center and revitalize the area, the city teamed with a private development company, Redevco, creating a public/private partnership to transform the property. Because a host of "big box" retail stores had recently located in outlying areas, this property could not support additional retail stores. Instead, the city and Redevco identified an untapped market niche—entertainment, cultural attractions, and restaurants. To enable these uses, the city created a new zoning overlay district that not only changed zoning requirements to allow arts and entertainment uses, but also exempted the developer from standard parking requirements by allowing shared parking in planned off-site public parking structures. The new zoning district also allowed outside cafes and seating to make the restaurants more inviting and attractive.

Under the city's generic parking requirements, art and entertainment uses would have required 390 new parking spaces, in addition to the existing spaces at the site required for existing retail. Construction of the additional

390 parking spaces would have cost approximately $1.9 million and would have also necessitated demolition of existing buildings, further increasing redevelopment costs and eliminating rental income from the lost buildings. Reducing the parking requirements and allowing shared parking reduced the development costs enough to make the redevelopment financially feasible.

The Shoppes of Wilton Manors now boasts full occupancy and rental rates of $32 per square foot (up from $8 per square foot). These two complementary factors—increased occupancy and increased rental rates—account for an increase in total annual rental income of $26 million, or 12 times its former rental income.

In addition to the financial success of the project, the revitalization of the Shoppes of Wilton Manors has provided other benefits to the community. The project has stimulated adjacent economic development. An office building next door that was vacant for 18 months now houses a law firm with 100 employees, many of whom frequent the restaurants and entertainment facilities at the Shoppes of Wilton Manors. Property values in the surrounding area are also improving; rental rates have almost doubled, from $6 to between $11 and $14 per square foot of leased space. The increased property value of the Shoppes of Wilton Manors—increasing by more than 10 times the initial value, from $226,000 to over $3.3 million—will add an estimated $80,000 in property tax revenues to the city. In addition, the other private investments along Wilton Drive have increased city-wide property tax revenues by 10 percent. Storefront and landscaping improvements make the area more attractive. Criminal activity has dropped due to the increased activity and vibrancy of the area. The walkable nature of the town center is enhanced as a result of improved site access. All of these benefits contribute to an improved quality of life for local residents and business people.

Some of the key elements in Wilton Manors' success include:

- The developer's and the city's willingness and commitment to work together;
- The city's flexibility in reducing parking requirements to support different redevelopment uses;
- Substantial cost savings resulting from parking reductions, making the redevelopment financially feasible; and
- Contributing to significant secondary benefits, including increasing the tax base and design improvements, by catalyzing surrounding development.

According to Redevco executive vice president, Debra Sinkle, the project succeeded because of the public/private partnership between the city and Redevco. The city's flexibility on zoning requirements and its commitment to the project created the confidence necessary for private investment.

TDM Program: Redmond, Washington SAFECO Insurance Company Expansion

King County Metro
King County, Washington

- Washington's most populous county, with almost 2 million residents
- Metro transit serves 75 million riders per year, and 5,000 vanpool commuters each day
- Provides TDM support services to employeers

The state of Washington's Commute Trip Reduction (CTR) law was passed in 1991 to improve air quality and mitigate traffic congestion. This transportation demand management measure targets the state's largest counties (those with populations greater than 150,000 people), requiring employers with more than 100 employees to implement programs to reduce single occupancy vehicle (SOV) trips to and from work. Through the state's CTR, employers monitor commuter travel patterns by administering employee surveys, which are written and processed by the state. The CTR established a goal of a 35- percent reduction in trips by 2005 compared to 1993 levels.

The headquarters of SAFECO Insurance Company of America is in Redmond, a suburb of Seattle in King County, one of the nine Washington counties affected by the CTR. SAFECO has responded to the CTR with an award-winning Transportation Management Plan (TMP) that includes employee transit passes, reserved parking for high occupancy vehicles (HOV), ride matching, vanpooling, and guaranteed rides home for employees at all its offices in the Seattle region.. By providing these services, SAFECO was allowed to build less parking for a recent expansion project below the city of Redmond's maximum levels.

SAFECO has undertaken a large-scale construction project to accommodate anticipated growth at its corporate headquarters in Redmond, adding three buildings (385,000 square feet of office space) and three parking structures (843 parking spaces) for the new office space. To preserve the attractive, park-like setting of the 48-acre campus and to maintain a pedestrian-friendly environment, SAFECO chose to construct all three parking structures underground. These subterranean spaces, while expensive to construct at $18,000 per space, preserve green space and make it easier to walk around the business park campus. The city of Redmond has maximum parking limits that would allow SAFECO to construct 1,155 spaces. Instead, SAFECO built 843 spaces, resulting in a parking ratio of 2.2 spaces per 1,000 square feet for the new office space. This amounts to a savings, relative to the maximum limits, of 312 parking spaces. Reducing the number of spaces allowed SAFECO to mitigate the higher cost of constructing underground parking, in addition to helping meet design goals.

While these parking reductions were not implemented as cost-cutting measures, the gross cost savings associated with the parking reductions (relative to the maximum limits) amount to $5.6 million in parking construction costs, or

about $491,000 annually.[1]

SAFECO's exemplary TMP reduced parking demand and allowed the company to build fewer parking spaces. SAFECO targets a portion of the savings to the TMP, approximately $261,000 per year including $75,400 for transit subsidies. Combining the full cost of transportation demand management at the Redmond campus and the savings from parking reductions, SAFECO annually saves $230,000 from parking reductions. Given that SAFECO would have incurred some of the costs of transportation demand management at its Redmond campus regardless of the parking reductions, the net savings actually exceed $230,000. SAFECO's decision to increase the density of its existing property, rather than move to another (likely ex-urban) location, also avoided the cost of procuring additional land.

Under its TMP, SAFECO agrees to maintain the rate of employees driving to work alone at or below 60 percent. Since 1997, SAFECO has kept these trips to between 57 and 59 percent of total commute trips. By comparison, 81 percent of east King County commuters drive alone, and 13 percent carpool (Washington State Department of Transportation 1999). Rather than drive alone, 15 percent of SAFECO employees carpool; 12 percent use vanpool services; 8 percent use public transit; and the remaining 7 percent bicycle, walk, or telecommute.

The company also maintains information on commuter vehicle miles traveled (VMT). On average, SAFECO employees travel between 6.5 and 7 miles one way. Thus, by maintaining an average 58 percent SOV rate for its 1,700 employees, SAFECO averts as many as 4,635 VMT each day, or about 1.2 million miles each year. These VMT figures assume two people per carpool and four people per vanpool. Thus, if the carpools or vanpools transport a greater number of passengers, this reduction in VMT would be greater.

- ***Air Quality Benefits:*** The environmental benefits associated with this reduction in automobile commute miles are significant. Avoiding almost 1.2 million miles of automobile travel also avoids approximately 27.56 tons of carbon monoxide, 3.85 tons of nitrogen oxides, and 2.20 tons of hydrocarbons each year.[2]
- ***Water Quality Benefits:*** Another significant, yet less quantifiable, environmental benefit of reduced parking is the preservation of pervious surfaces to absorb rainfall and prevent polluted runoff. Increasing the amount of impervious areas through paving can alter

[1] This annual amount is only associated with construction costs and assumes constant payments, an interest rate of 7.25 percent, and a 25-year payment period per discussion with SAFECO transportation manager.

[2] Calculated using average emissions factors from EPA's Office of Mobile Sources' *Compilation of Air Pollution Emissions Factors, Volume II: Mobile Sources: (AP-42)*, which provides the following emissions factors: 21.05 grams of carbon monoxide emitted per VMT, 2.97 grams of nitrogen oxides emitted per VMT, and 1.71 grams of hydrocarbons emitted per VMT.

the area's hydrologic system and cause runoff mixed with oil and other contaminants to pollute receiving streams, rivers, lakes, and estuaries. With approximately 40 inches of precipitation each year and many fishable streams, the King County ecosystem is especially susceptible to polluted runoff. An additional 312 parking spaces in above-ground lots would mean another 100,000 square feet of impervious surfaces.

Several key factors contributed to the success of SAFECO's program.

SAFECO Insurance Company

Profile:
- Expanded office park by 385,000 square feet
- 843 underground parking spaces, 27 percent less than typical requirement

Strategy:
- TDM plan including vanpools, transit passes, guaranteed rides home

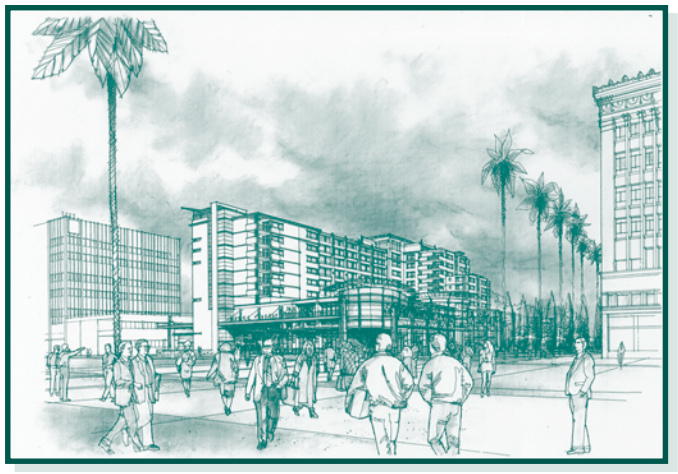
Benefits:
- Eliminating unnecessary parking saves $230,000 annually
- Employees avoid commuting costs and receive transit benefits
- Employees drive about 1.2 million miles less per year
- Less driving avoids about 33 tons of pollutants per year
- Reduced pavement for parking leads to less storm water runoff

- The city of Redmond was flexible and cooperative in allowing SAFECO to increase density on the existing property.
- SAFECO has an environmentally responsible corporate ethic of reducing parking below the maximum limits and staying in Redmond rather than relocating.
- Frequent and reliable public transit through King County Metro enables SAFECO employees to use alternative modes of transportation even when commuting from other towns in the county.
- SAFECO did not require outside financing. SAFECO's transportation management director believes that, had the project required outside funding, lenders might have resisted making loans unless more parking was provided in the development plan.

Shared Parking and In-Lieu Fees: Long Beach, California Embassy Suites at the D'Orsay Promenade

The city of Long Beach, California, recognizes that creating high-quality downtown development requires balancing the costs and supply of parking with other community goals, including economic development and walkability. In its Downtown Parking Management Plan, the city's redevelopment agency promotes small- and large-scale urban development by allowing for shared parking and in-lieu parking fees. The types of development projects eligible for these parking alternatives include non-residential new construction on lots less than 22,500 square feet, additions or rehabilitation to existing build-

ings, and renovation of historic landmark buildings.



The four-star Embassy Suites at the D'Orsey Promenade, which was proposed to the city in 1998, provides an example of how cities can use parking reductions to facilitate redevelopment. The proposed D'Orsay Hotel included a 162-room boutique hotel with 35,000 square feet of retail space. The property, on a three-block pedestrian walkway in downtown Long Beach was previously a surface parking lot.

Other development proposals for this property had been made to the city, but fell through in part due to the financial burden imposed by the city's minimum parking requirements. They would have required the developer to construct one parking space per hotel room and four spaces per 1,000 square feet of gross floor area (GFA) of retail space, totaling 302 spaces. With construction costs of $16,000 per parking space, the parking costs would have totaled $4.83 million, making the project fiinancially infeasible.

The developer worked with the city, which conducted a traffic study to assess parking demand at other Long Beach downtown hotels. The city's planning department determined that this mixed-use hotel and retail development did not require the minimum number of parking spaces and modified the requirements in part by allowing the hotel and retail to share the available

Modified Parking Requirements for the D'Orsay Hotel

	Requirement	Gross Floor Area (GFA)	# of Spaces Required	Cost per Space	Total Cost (millions)
Generic Requirements					
Retail	4 spaces/1,000 square feet GFA	35,000 square feet	140	$16,000	$2.24
Hotel	1 space/room	162 rooms	162	$16,000	$2.59
Total	--	--	**302**		**$4.83**
Revised Requirements					
Retail	3 spaces/1,000 square feet GFA	35,000 square feet	105	$16,000	$1.68
Hotel	0.70 spaces/room	162 rooms	113	$16,000	$1.81
Total	--	--	**218**		**$3.49**
Revised Requirements and In-Lieu Fees					
Retail & Hotel On-Site	N/A	N/A	162	$16,000	$2.59
Retail & Hotel Off-Site	N/A	N/A	56	$3,000	$0.168
Total	--	--	**218**		**$2.76**
(With In-Lieu Fees)					

spaces. The plan reduced the retail parking space required to three spaces per 1,000 square feet. The hotel's valet parking system allowed the reduction of parking requirements for the hotel space, to 113 spaces for the 162 rooms. These modifications reduced the number of required spaces by 84.

However, parking construction costs still made the project financially infeasible. Even with the revised requirements, the 218 parking spaces for this project would cost $3.49 million to build. Upholding its mission to encourage urban revitalization, the city of Long Beach Redevelopment Bureau agreed to further adjust the parking requirements by charging in-lieu fees in places of 56 of the required spaces. The in-lieu fee was $3,000 per parking space plus an additional $50 per space per month to cover parking operating and maintenance expenditures. The city is obligated to provide those parking spaces near the hotel.

D'Orsay Hotel

Profile:
- Boutique hotel with retail space on former downtown parking lot
- 162 parking spaces, 47 percent less than typical requirement

Strategy:
- Parking study to assess market demand
- Shared parking
- In-lieu fees to provide off-site parking

Benefits:
- Eliminating unnecessary parking saved $2 million in construction costs, making project financially feasible
- Provides new shopping and work opportunties downtown
- Adds $300,000 in new tax revenues annually, to be used for further revitalization projects

As shown in the accompanying table, the revised parking requirements decreased the developer's parking construction costs by over $2 million, with $730,000 of the savings coming from the in-lieu fee arrangement. This reduction made the entire project financially feasible. These cost savings significantly improved the projected financial net returns for the proposed project and ultimately facilitated revitalization of the surrounding area.

The hotel is expected to generate approximately $300,000 annually in additional property tax revenues for the city. Because this property is in an economically troubled area qualified to receive special assistance as a "California Redevelopment Project Area," the property tax revenue generated from the project will be directed back into the area for further redevelopment and infrastructure improvements. In addition, the state will receive revenues from California's 8.25 percent sales tax, and the city will receive revenues from the 10 percent hotel tax. The D'Orsay Hotel will give Long Beach residents an active and pedestrian friendly downtown with multiple amenities. Infill redevelopment like the D'Orsay Hotel and other projects may help to reduce development pressures on outlying areas and encourage additional redevelopment.

This successful redevelopment was made possible by several elements:

- The city of Long Beach's flexibility and recognition that parking is expensive and consumes valuable land. This enabled the developer to negotiate the reduced parking requirements and in-lieu fees that made the project feasible.
- Combining two types of innovative parking strategies (shared parking and in-lieu fees). This was necessary to make the development

project financially feasible.

- Conducting a development-specific traffic study to estimate the number of parking spaces needed for development. The study of other downtown Long Beach hotels showed that applying the city's parking standards would have resulted in an excess supply of parking at the D'Orsay Hotel.

References

Boulder Community Network. July 16, 1999. "CAGID Transportation Survey." http://bcn.boulder.co.us /gettingthere/cagidsurvey/cagidsurvey.html.

Boulder Community Network. July 16, 1999. "Downtown Boulder Employees' Transportation Discount Card." http://bcn.boulder.co.us /gettingthere/discount/index.html.

Burchell, Robert W., Listokin, David, Dolphin, William R., et. al. 1994. *Development Impact Assessment Handbook*. Washington, D.C.: The Urban Land Institute.

Center for Livable Communities. 1998. *Policymaker's Guide to Transit-Oriented Development*. Washington, D.C.

Chattanooga News Bureau. July 16, 1999. "Chattanooga's Electric Bus Initiative." http://virtual.chattanooga.net/etvi/bus.html.

Chesapeake Bay Foundation. 2001., *Building Healthier Neighborhoods with Metrorail. Rethinking Parking Policies.* Annapolis, MD: Chesapeake Bay Foundation.

City of Boulder, Colorado, Public Works Department. July 13, 1999. "Go Boulder General Programs." http://go.boulder.co.us/pubs/publications_menu.html.

City of Bremen. 2002. "Mobility Services for Urban Sustainability." http://213.170.188.3/moses/m_papers/brochure_web.pdf.

City of Cambridge, Massachusetts. 1999. Cambridge Municipal Code, Chapter 10.

City of Cambridge, Massachusetts. 1992. Vehicle Trip Reduction Ordinance.

City of Coral Gables. 1998. Coral Gables Zoning Code, Article 13: Off-Street Parking and Loading.

City of Long Beach, Long Beach Redevelopment Agency. December 16, 1993. Downtown Parking Management Plan.

City of Portland, Bureau of Planning. May 1999. Title 33: Planning and Zoning Code, Chapter 33.510, Part Two.

City of Olympia Public Works Department and the Washington State Department of Ecology. May 1995. *Impervious Surface Reduction Study: Final Report*.

City of Seattle. 2001. *Your Guide to Parking Management.* www.cityofseattle.net/planning/transportation/odf/Parkingguide.pdf.

City of West Palm Beach and West Palm Beach Community Redevelopment Agency. December 4, 1995. Downtown Master Plan for the City of West Palm Beach.

City of Wilton Manors. February 1997. Ordinance No. Z-195.

Commonwealth of Massachusetts, Executive Office of Transportation and Construction. July 25, 1992. "Boston and Cambridge Parking Freeze Estimates of "Effects of Change." Memorandum prepared by Daniel Beagan and Sonia Hamel.

Commuter Challenge. April 4, 1999. "Managing Transportation Demand: Benefits for Business." www.commuter challenge.org/cc/benefits.html.

Commuter Challenge. April 29, 1999. "SAFECO Insurance Companies, Redmond Campus." www.commuterchallenge.org/cc/profiles.html.

Comsis Corporation. January 1994. *Overview of Travel Demand Management Measures: Final Report*. Washington, D.C.: Federal Highway Administration and the Federal Transit Administration.

Downtown Circulation Advisory Group, Seattle, Washington. November 1998. *Downtown Circulation Study*. Recommendation to SEATRAN.

Dunphy, Robert; Cervero, Robert; Dock, Fred; McAvey, Maureen; and Douglas Porter. 2005 *Developing Around Transit.* Washington, D.C.: The Urban Land Institute.

Edwards, John. 1994. *The Parking Handbook for Small Communities*. Washington, D.C.: The National Trust for Historic Preservation and The Institute of Transportation Engineers.

Ewing, Reid and Shi-Chiang Li. 1998. *A Vehicle Ownership Model for FSUTMS*, Washington, D.C.; National Research Council, Transportation Research Board.

Highland, Randy. March 1993. "The Cost Per Car of a Parking Garage: Seven Points an Owner Should Know When Building a Parking Structure." *Skylines*.

Holtzclaw, John; Clear, Robert; Dittmar, Hank; Goldstein, David; and Haas, Peter. 2002. "Location Efficiency: Neighborhood and Socio-Economic Characteristics Determine Auto Ownership and Use - Studies in Chicago, Los Angeles and San Francisco." *Transportation Planning and Technology.* 25 (1): 1-27.

Institute of Transportation Engineers. 2004. *Parking Generation*, 3d ed. Washington D.C.

International City/County Management Association. 2003. *Getting to Smart Growth II.* Washington, D.C.: the Smart Growth Network.

International City/County Management Association. 2002. *Getting to Smart*

Growth. Washington, D.C.: the Smart Growth Network.

Keeling, Rod. March 1998. “The State of Downtown Parking Today.” *Parking Today*.

Knight, Deborah. November/December 1998. “Looking Backward: The New Urbanism Movement is Seeking to Restore the Center.” *Sanctuary: The Journal of the Massachusetts Audubon Society*.

Kodama, Michael R., Richard Willson, William Francis & Associates. June 1996. *Using Demand-Based Parking Strategies to Meet Community Goals*. Prepared for the Mobile Source Air Pollution Reduction Committee.

Kuzmyak, Richard J., and Richard H. Pratt. 2003. “Land Use and Site Design” *Traveler Response to Transportation System Changes.* Transit Cooperative Research Program Report 95, Chapter 15. Transportation Research Board.

Litman, Todd. 2005a. *Online TDM Encyclopedia*. www.vtpi.org/tdm. Victoria, B.C.: Victoria Transport Policy Institute.

Litman, Todd. 2005b (forthcoming). *Parking Management Best Practices*. Planners Press.

Litman, Todd. 2003 “Parking Costs.” *Transportation Cost and Benefits Analysis: Techniques, Estimates and Implications*. www.vtpi.org/tca/tca0504.pdf. Victoria, B.C.: Victoria Transport Policy Institute.

Litman, Todd. 2000. “Transportation Land Valuation: Evaluating Policies and Practices That Affect the Amount of Land Devoted to Transportation Facilities.” www.vtpi.org/land.pdf. Victoria, B.C.: Victoria Transport Policy Institute.

Maryland Governor’s Office of Smart Growth. 2005. *Driving Urban Environments: Smart Growth Parking Best Practices.* Annapolis, MD: State of Maryland.

Millard-Ball, Adam. April 2002. "Putting on their Parking Caps." *Planning.* 16-21.

Montgomery County, Maryland. November 1997. Montgomery County Code Zoning Ordinance, Chapter 59, Article 59-E.

National Parking Association & Parking Consultants Council. 1992. “Recommended Zoning Ordinance Provisions for Parking and Off-Street Loading Spaces.” National Parking Association Number 0502-92.

Nelson\Nygaard Consulting Associates. 2002. City CarShare Vehicle Ownership Survey. Unpublished survey for City CarShare, San Francisco.

Northwest Environment Watch. December 9, 1998. “The Car and the City: Comparison of Portland, Seattle and Vancouver.”

www.northwestwatch.org/ccex.html.

Pratt, Richard H. 2003. “Parking Management and Supply” *Traveler Response to Transportation System Changes.* Transit Cooperative Research Program Report 95, Chapter 18. Transportation Research Board.

Russo, Ryan. 2001. *Planning for Residential Parking: A Guide for Housing Developers and Planners*. Non-Profit Housing Association of Northern California and Berkeley Program on Housing and Urban Policy.

Shoup, Donald 2005. *The High Cost of Free Parking.* Washington DC, American Planning Association

Shoup, Donald. 2002. "Truth in Transportation Planning," *Journal of Transportation and Statistics*.

Shoup, Donald. 1999a. “In Lieu of Required Parking.” *Journal of Planning Education and Research*, Vol. 18.

Shoup, Donald. 1999b. "The Trouble with Minimum Parking Requirements." *Transportation Research A*, 33: 549-574. Also available at www.vtpi.org/shoup.pdf.

Shoup, Donald. 1997a. “Evaluating the Effects of Cashing Out Employer-Paid Parking: Eight Case Studies.” *Transport* Policy 4(4): 201-216.

Shoup, Donald. 1997b. “The High Cost of Free Parking.” *Journal of Planning Education and Research* 17: 3-20.

Shoup, Donald. 1995. "An Opportunity to Reduce Minimum Parking Requirements." *Journal of the American Planning Association.* 61(1): 14-28.

Smith, T.P. 1988. *The Aesthetics of Parking*. Planning Advisory Service Report Number 411. Washington, D.C.: American Planning Association.

Smith, T.P. 1983. “Flexible Parking Requirements.” Planning Advisory Service Report No. 377. Washington, D.C.: American Planning Association.

Smith, Mary S. September 1996. “Circle Centre: How Parking Helped Make Urban Retail/Entertainment Development Work.” *Parking*.

South Florida Regional Planning Council. December 1998. *Building on Success - A Report from Eastward Ho!*

South Florida Regional Planning Council. 1998. *Downtown Kendall Master Plan*.

South Florida Regional Planning Council. September 1998. *The Eastward Ho! Newsletter*.

South Florida Regional Planning Council. July 1996. *Eastward Ho! Revitalizing Southeast Florida’s Urban Core*.

Tracy, Joseph L. October 1996. “What’s Your Cost?” *The Parking Profes-*

sional.

Transportation and Land Use Coalition. 2002. "Housing Shortage/Parking Surplus. Silicon Valley's Opportunity to Adress Housing Needs and Transportation Problems with Innovative Parking Policies." Oakland, CA: Transportation and Land Use Coalition and Nelson\Nygaard Consulting Associates. www.transcoalition.org/southbay/housing_study/index.html.

Tri-County Metropolitan District of Oregon. June 6, 1999. "Beyond the Field of Dreams: Light Rail and Growth Management in Portland." www.trimet.org/reports/dreams.htm.

Tumlin, Jeffrey, and Siegman, Patrick. Summer 1993. "The Cost of Free Parking." The Urban Ecologist.

Urban Land Institute. 2005. *Shared Parking: 2nd Edition*. Washington, D.C.

Urban Land Institute. 1997. *Market Profiles 1997: North America*. Washington D.C.: the Urban Land Institute.

Urban Land Institute and the National Parking Association. 1993. *The Dimensions of Parking*, 3d ed. Washington D.C.: the Urban Land Institute.

U.S. Environmental Protection Agency, and U.S. Department of Transportation. 2005a. "Best Workplaces for Commuters." www.bwc.gov, accessed 12/2005.

U.S. Environmental Protection Agency, Office of Transportation and Air Quality. 2005b. *Compilation of Air Pollutant Emission Factors, Vol. II: Mobile Sources: (AP-42), 5th Edition*. Washington, D.C: U.S. Environmental Protection Agency. Accessed at www.epa.gov/otaq/ap42.htm 12/2005.

U.S. Environmental Protection Agency. 2004. *Protecting Water Resources with Smart Growth.* (EPA 231-R-04-002). Washington, D.C.: U.S. Environmental Protection Agency.

U.S. Environmental Protection Agency. 2001a. *Our Built and Natural Environments*. EPA 123-R-01-002. Washington, D.C.: U.S. Environmental Protection Agency.

U.S. Environmental Protection Agency. 2001b. *Improving Air Quality Through Land Use Activities.* (EPA 420-R-01-001). Washington, D.C.: U.S. Environmental Protection Agency.

U.S. Environmental Protection Agency. April 1998. *$mart Investments for City and County Managers: Energy, Environment, and Community Development.* EPA 231-R-98-004. Washington, D.C.: U.S. Environmental Protection Agency.

Village of Schaumburg. 1998. Schaumburg Parking Ordinance, Chapter 154.

Washington State Department of Transportation, Commute Trip Reduction Office. 1999. *Local Government Parking Policy and Commute Trip Reduction: 1999 Review*.

Washington State Department of Transportation. May 5, 1999. "Transportation Demand Management (TDM)." http://wsdot.wa.gov/PubTran/CTR.ctrweb/sample/tdm.htm.

Washington State Department of Ecology and City of Olympia, Public Works Department and Water Resources Program. May 1995. *Impervious Surface Reduction Study: Final Report*.

Wilbur Smith & Associates, Inc. 1982. *Parking Requirements for Shopping Centers: Summary Recommendations and Research Study Report*. Washington, D.C.: The Urban Land Institute.

Willson, Richard W. Winter 1995. "Suburban Parking Requirements: A Tacit Policy for Automobile Use and Sprawl." *Journal of the American Planning Association* 61(1).

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