Driving Urban Environments:
Smart Growth Parking Best Practices

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TABLE OF CONTENTS

INTRODUCTION

Over the last 50 years, new patterns of development have reflected both the mobility and convenience provided by the car and the segregation of land uses decreed by zoning codes that put residences in one area, offices in another, and retail in yet another spot. Increasingly far-flung destinations and more complex daily activities rely on the ability to get from one place to another as fast and predictably as possible. We have to drive to get from work to home to shopping, and at each place, we need to park. We expect safe, plentiful, easily accessed parking at work, at home, and at the store. Parking has become part of our culture: an office perk, a selling point for retailers, a display case for a household's cars and a requirement for financing development projects.

Our communities have become increasingly worried, however, about the downside of an auto-based landscape that is no longer holding the promise of progress and growth, but rather fosters congestion that steals precious time from our lives. In contrast to auto-oriented sprawl, smart growth recognizes that the future and vitality of our communities is dependent upon our ability to foster a better planned, more environmentally protective, more sustainable pattern of development.

This work, however, does not come without its challenges, and no aspect of development illustrates this better than parking. Indeed, one of the biggest challenges facing smart growth is identifying new ways to address the need for parking while minimizing its negative impacts and encouraging better and different design. Parking is consuming a huge amount of land that could otherwise be developed. Surface and structured parking lots present sterile, unattractive environments that deaden city and suburban streets alike, further isolate uses and preclude lively pedestrian-friendly streets. Moreover, the adverse environmental impacts of parking lots, particularly on water quality, are increasingly recognized.

As developers attempt to meet the parking requirements of their projects, they find themselves beset with obstacles related to zoning, financing, and design, just to name a few. Parking requirements now drive many site designs, and are often the make or break issue for financing new developments. Too many quality smart growth projects remain on the drawing board because they simply cannot solve the parking dilemma. We need parking, but we need to re-think parking design, parking financing, and parking supply and demand to better meet the needs of communities, developers, and users.

This study presents an overview of parking strategies that meet the challenges faced by projects in the context of smart growth. Recognizing the importance of parking in development, it looks for new ways to manage parking supply and demand, to design parking facilities, and to provide financing, offering more, not fewer, options to communities, households and developers. These creative approaches are intended to promote better project design, reduce construction and operational costs, and add value to development projects.

The main sections of this study specifically address these three areas—parking management, parking design, and parking financing. The first section identifies parking management strategies that control the supply and demand for parking. The following section proposes innovative design strategies that reduce the aesthetic and environmental impacts of parking facilities, including on-street parking, surface parking lots, and parking structures. The final section outlines various financing mechanisms and incentives for the construction of both public and private parking structures.

It is hoped that this study will inform and engage local governments, developers, financial institutions, and citizens in a dialogue that will lead to broader implementation of "win-win" parking solutions, enhancing the attractiveness, convenience, and quality of life in communities across Maryland and beyond.

PARKING MANAGEMENT

As dependency on the automobile has grown, local policies have reinforced the car culture, accommodating increased parking demand through local zoning ordinances. The primary tool local governments have used to accommodate parking is parking ratio ordinances, which establish the minimum number of spaces a development project must provide for a given land use and project size. Table 1 outlines some of these general standards for minimum parking requirements based on land use. These ratios are typically drawn from generic parking generation rates, irrespective of site-specific and project-specific characteristics and other variables that would help to more accurately reflect market reality. The overstatement of parking ratios has in many cases led to an oversupply of parking.

There are many problems associated with current parking ratios and the subsequent oversupply of parking. These traditional approaches to regulating parking lead to vast expanses of parking which in turn separate land uses, reduce densities, impair walkability, and create obstacles to providing transit and pedestrian friendly communities. From a developer's perspective, inflated parking ratios reduce the development potential of a site, requiring more land to be used for parking as opposed to a higher and better use, and adding significant costs to development projects. In fact, some development projects may not be financially feasible under current local parking policies.

TABLE 1. General Standards for Minimum Parking Requirements

LAND USE	PEAK SPACE FACTOR	UNIT
Shopping Center > 600,000 square feet	4.5 spaces	per 1,000 square feet gross leasable area
Shopping Center < 600,000 square feet	4.0 – 4.5 spaces	per 1,000 square feet gross leasable area
Office	0.50 – 3.00 spaces	per 1,000 square feet gross leasable area, or
	0.10 – 0.75 space	per employee
Industrial	0.67 – 3.50 spaces	per 1,000 square feet gross leasable area, or
	0.36 – 1.60 spaces	per employee
Residential	0.20 – 2.00 spaces	per unit

Source: Urban Land Institute and National Parking Association, *The Dimensions of Parking*, Fourth Edition [Washington, D.C.: ULI, 2000]

Addressing these concerns requires local jurisdictions and developers to work together to revise parking policies to more appropriately manage parking. Revised parking policies should accommodate necessary parking, while at the same time encouraging attractive, pedestrian and transit friendly urban design, promoting alternative modes of transportation, preserving open space, and improving air and water quality.

This section of the paper details parking management best practices that aim to achieve the above mentioned objectives. Such "practices" or strategies include reduced minimum parking requirements, parking maximums, area-wide parking caps, shared parking, and parking districts. These strategies could be required through local zoning ordinances or be voluntary, on a project-by-project basis, implemented through developers' agreements. Given that efforts to control the supply of parking will only be feasible and effective when there are concurrent efforts to reduce the demand for parking, this section also proposes various best practices to reduce the demand for parking including transit investments, transit-oriented development and traditional neighborhood design policies, transportation demand management programs, unbundled parking, and parking pricing strategies.

Limiting Parking Supply

Local planners have traditionally regulated the supply of parking through zoning codes that prescribe minimum parking requirements for development projects based on land use and size. These minimum

requirements are typically drawn from parking generation rates and standards that are published by the Institute of Transportation Engineers. In one such commonly used publication, *Parking Generation*, the parking generation rates are derived from a small number of studies that measure peak parking demand at suburban locations, where parking is free and there is no public transit (Shoup, *Roughly Right or Precisely Wrong*). The maximum parking demand from these studies oftentimes becomes the minimum parking requirement established in zoning codes. Recognizing the limitations of these parking generation rates, planners will sometimes look to zoning codes in comparable cities to further inform their own minimum parking requirements. However, this comparison is also quite limited in that it cannot account for all of the geographic and demographic factors specific to a particular jurisdiction or development site. As a result of applying published generic parking standards or borrowing parking standards from seemingly comparable cities, minimum parking requirements tend to be excessive and inflexible, leading to more parking than is necessary.

Vast expanse of underutilized parking at shopping center in Towson, Maryland.

One of the primary ways local planners can more appropriately control the supply of parking is by revising local zoning ordinances to more accurately reflect local parking demand and circumstances. This portion of this section proposes potential revisions to local zoning ordinances including reduced parking requirements given a project's proximity to transit, surrounding land uses, demographics of prospective users, implementation of transportation demand management programs, or payment of fees in lieu of parking. Other strategies that might be considered for incorporation in local ordinances include parking maximums, area-wide parking caps, and shared parking. The roles parking management districts can play in controlling the supply of parking are also discussed in this section.

Reduced Minimum Parking Requirements

Local zoning ordinances have historically controlled the amount of parking at a site by imposing minimum parking requirements, calculated as a ratio of the number of parking spaces required per square foot, per dwelling unit, or other measure of intensity. This ratio varies by the type of land use. Rather than imposing inflexible requirements, local zoning ordinances could incorporate mechanisms to tailor parking requirements to specific development projects. The following list of factors are among those that should be considered.

- *Locational Factors*. The location of the proposed project will impact parking demand. For example, if a project is well served by mass transit, the project might generate a lower parking demand than what would otherwise be anticipated, relying on generic parking generation formulas. Moreover, if the proposed project is located amidst high-density development with a mix of land uses, there might be existing parking facilities nearby, thus reducing the demand for parking on-site. Users may also access the project and other nearby uses on foot, further reducing parking demand.

- *Demographic Factors*. The demographics of the anticipated users of a project, including employees, customers, and residents, will impact parking demand. For example, due to

Reduced Minimum Requirements for Locational and Demographic Factors - San Diego, California

The San Diego Municipal Code permits reduced minimum parking requirements for residential, office, retail, institutional, and industrial uses in designated transit areas and for residential uses in designated very low income areas. With respect to residential uses, the minimum parking requirements can be reduced in multiple dwelling unit developments, depending on the multiple dwelling unit type (number of bedrooms). For example, in a multiple dwelling unit development with 2 bedroom units, the basic minimum parking requirement is 2 spaces per dwelling unit; however, in both transit areas and very low income areas this requirement is reduced to 1.75 spaces per dwelling unit. With respect to nonresidential uses, the reduction in minimum parking requirements for developments in transit varies based on use. However, in general the minimum parking requirement for nonresidential uses in transit areas is about 85% percent of the minimum requirement for development outside transit areas.

the high cost of car ownership, low-income residents generally have lower levels of car ownership than that of the general public. If the anticipated users of a proposed project have low levels of car ownership, the project might generate a lower parking demand than what would otherwise be anticipated. The age distribution of anticipated users will also be indicative of parking demand. For example, if the anticipated users of a proposed project are seniors, the project will necessitate less parking than what would otherwise be anticipated.

In addition to tailoring parking requirements to project-specific conditions such as locational and demographic factors, local zoning ordinances might also prescribe reductions to minimum parking requirements on a project-by-project basis in exchange for a developer's commitment to a transportation demand management program or payment of fees in lieu of providing the required parking.

- *Transportation Demand Management Programs*. Transportation Demand Management (TDM) programs are typically employer-led programs intended to reduce the parking demand of employees by supporting carpooling, offering subsidies for transit, furnishing bicycle facilities, and providing shuttle service from off-site parking facilities. These features of TDM programs are discussed in greater detail in the following section on controlling parking demand. An example of a jurisdiction that reduces minimum parking requirements in exchange for an employer's creation and implementation of a TDM program is Hartford, Connecticut, where parking requirements can be reduced up to 30 percent in exchange for discounted carpool parking, rideshare promotions, subsidized transit passes and shuttle service from off-site parking.

- *Fees-in-lieu*. Fees-in-lieu are established by jurisdictions as an alternative to requiring on-site parking facilities. More specifically, some local jurisdictions allow reductions to minimum parking requirements in exchange for developer payment into a municipal parking or traffic mitigation fund. The accrued money from the municipal parking fund helps finance city-owned, centrally located, off-site parking facilities. The in-lieu fees may be mandatory or voluntary and are set either by calculating a flat rate for each parking space not provided or by carefully determining appropriate development-specific fees on a case-by-case basis. By paying fees-in-lieu, developers have the ability to circumvent constructing on-site parking facilities, and are subsequently able to improve site design and preserve unique and historic resources that might otherwise be demolished to accommodate on-site parking. Fees-in-lieu tend to be very effective when rapid development is occurring in a defined area. However, absent a critical mass of concurrent development projects in a defined area, the municipal parking fund may only increase in increments insufficient to develop municipal parking structures in a timely manner (Urban Land Institute 2000). As a result, developers might only opt to pay in-lieu fees when a parking facility will be available on a definite schedule and within an acceptable proximity to the development project. An example of a jurisdiction that allows developers to pay fees-in-lieu of the required parking is the Town of Westport, Connecticut. The Town's Zoning Regulations allow for developers to pay fees-in-lieu of providing all or a portion of the off-street parking spaces required for projects located in a designated Historic Design District. In this example, the fee-in-lieu of parking is set at $2,000 per

Reduced Minimum Requirements for Transportation Demand Management Programs – Seattle, Washington

The Seattle Municipal Code stipulates that for office or manufacturing uses that require 40 or more parking spaces, the minimum parking requirements may be reduced up to 40% by substituting transportation demand management programs. These provisions include:

- for every certified carpool space, the total parking requirement may be reduced by 1-9/10 spaces up to a maximum of 40% of the total parking requirement;
- for every certified vanpool purchased or leased by the applicant for employee use, the total parking requirement may be reduced by 6 spaces up to a maximum of 20% of the total parking requirement;
- if transit passes are provided to all employees and transit service is within 800 feet of the development, the total parking requirement may be reduced up to 10%; and
- for every 4 covered bicycle parking spaces provided, the total parking requirement may be reduced by 1 space up to a maximum of 5% of the total parking requirement.

deficit parking space and must be paid in full by the applicant prior to the issuance of a zoning permit.

Local zoning ordinances should be clear about the terms and conditions for reductions to minimum parking requirements "by-right", specifying the percent of required spaces that can be reduced for such conditions as proximity to transit, surrounding land use mix and density, demographics and behaviors of prospective users, implementation of TDM programs, and payment of fees-in-lieu. By setting clearly defined terms and conditions for reductions in minimum parking requirements, local jurisdictions can limit the number of projects that have to go through the lengthy and uncertain process of receiving a zoning variance.

Although reduced minimum parking requirements might benefit developers by reducing the costs associated with the construction, operation, and maintenance of parking facilities, developers may not opt for the reduced parking requirement because of impacts insufficient parking might have on the marketability of the project to lending institutions and prospective users. As a result, developers might still oversupply parking in order to meet inflated financing standards set by lending institutions. However, in many cases, lending institutions do refer to local zoning, and local jurisdictions have been revising local zoning ordinances to incorporate parking maximums or area-wide parking caps to ensure there is not an oversupply of parking; these strategies are discussed in the next part of this section.

Parking Maximums and Areawide Parking Caps

As discussed in the previous section on reduced minimum parking requirements, local zoning ordinances usually establish the amount of parking developers must provide. However, in contrast to minimum parking requirements, it is becoming more and more common for local jurisdictions to revise zoning ordinances to incorporate parking maximums or areawide parking caps, both intended to ensure that there is not an excess supply of parking.

- *Parking Maximums*. Parking maximums restrict the total number of parking spaces that can be constructed at a particular development site. For example, the City of Seattle allows a maximum of one parking space per 1,000 square feet of downtown office space, and is considering extending this maximum to areas outside of the downtown. The City of San Francisco limits parking to 7% of a downtown building's floor area (Millard-Ball 2002). Maximums can complement minimum parking requirements, thus ensuring a threshold level of parking supply, or can stand alone, leaving individual developers to determine the appropriate amount of parking necessary. While reduced minimum parking requirements allow developers the choice of providing more parking than the required amount, parking maximums are absolute limits on the amount of parking that can be provided. As such, parking maximums leave little room for making mistakes in projecting parking demand. If a jurisdiction underestimates parking demand and sets maximums too low, developers cannot "second guess" that decision and provide more parking, as they can with reduced minimum parking requirements.

- *Areawide Parking Caps*. Areawide parking caps limit the total number of parking spaces that can be constructed in a defined area. Similar to parking maximums, areawide parking caps set

Parking Maximums – Portland, Oregon

The Portland City Code has implemented parking maximums to complement parking minimums in areas outside the Central City district. The zoning ordinance specifies that the purpose of such provisions is to promote the efficient use of land, enhance urban form, encourage use of alternative modes of transportation, provide for better pedestrian movement, and protect air and water quality. The maximums vary with the use the parking is serving and the location of the use. That is, areas that are zoned for more intense development and are easily reached by alternative modes of transportation have lower maximums than areas of less intense development or less frequent or no transit service. For example, the minimum parking requirement for general office use is 1 space per 500 square feet of floor area, and the maximum parking requirement is 1 space per 294 square feet of floor area. However, if the development is located more than ¼ mile from a transit stop with 20-minute peak-hour bus service and more than ½ mile from a transit stop or station with 20-minute peak-hour light rail or streetcar service, the maximum number of parking spaces is actually increased to 125% of what otherwise would be the maximum requirement.

an absolute limit on the amount of parking that can be provided, in so doing, leaving little room for mistakes in projecting parking demand. Areawide parking caps require considerable administrative and planning effort to determine the appropriate number of parking spaces for a defined area, and to accurately apportion the allotted spaces to specific development projects.

Both parking maximums and areawide parking caps encourage better utilization of existing parking facilities and force businesses to encourage their employees and customers to use alternative modes of transportation. In fact, many jurisdictions that have instituted parking maximums or areawide parking caps have done so in response to non-attainment of environmental standards, particularly, air quality standards. For either parking maximums or areawide parking caps to be successful, it is imperative to have accessible and frequent public transportation, and the jurisdiction must have a strong real estate market, where the locational advantages considerably outweigh the perceived drawback of a lack of parking.

Shared Parking

Shared parking can be defined as parking utilized jointly among different buildings and facilities in an area to take advantage of different peak parking characteristics that vary by time of day, day of week, and/or season of year. For example, many businesses or government offices experience their peak business during normal daytime business hours on weekdays, while restaurants and bars peak in the evening hours and on weekends. This presents an opportunity for shared parking arrangements. Historically, local zoning ordinances have not permitted shared parking—stating that if two or more uses are located on the same lot or in the same structure, the total number of parking spaces required equals the sum of spaces required for each individual use. Since most parking spaces are only used part time, this policy leads to the underutilization of many parking facilities, with a significant portion of spaces unused. On the other hand, by allowing for and encouraging shared parking, local jurisdictions can decrease the total number of spaces required relative to the total number of spaces needed for each land use separately. As a result, allowing for shared parking arrangements significantly reduces the amount of land devoted to parking and, in so doing, creates more opportunities for creative site planning and landscaping.

Some local jurisdictions do incorporate language in local ordinances to permit and even encourage shared parking. These jurisdictions allow shared parking to meet minimum parking requirements for uses located within the same lot or building and also permit off-site shared parking arrangements to meet on-site parking requirements for complementary uses within a defined area. One way in which local ordinances help enable shared parking is to allow for off-street parking facilities to be located off-site of the lot on which the structure or use being served is located. Such ordinances usually specify a maximum distance from the structure or use within which the off-site parking facility must be located. These location requirements are typically based on acceptable walking distances. For example, the San Diego (CA) Municipal Code states that shared parking facilities must be located within 600 feet of the uses served. The Eugene (OR) Municipal Code allows for a longer distance stating that required off-street parking facilities must be within 1320 feet of the development site that the parking is required to serve. In addition to revisions to local zoning codes to enable shared parking, shared parking arrangements can be implemented through shared parking agreements between individual developers or the construction of public parking facilities.

There are several barriers to implementing shared parking arrangements. In particular, there is a considerable amount of planning needed to determine the appropriate number of parking spaces under shared parking arrangements. Some local jurisdictions calculate this number through the following method: 1) determine the minimum amount of parking required for each land use as though it were a separate use, by time period; 2) calculate the total parking required across uses for each time period; and 3) set the requirement at the maximum total across time periods. Other jurisdictions allow for the parties involved to determine the appropriate number of spaces. In these cases, the applicants must submit an analysis that shows that peak parking times occur at different times and that the parking area will be large enough to accommodate the anticipated demand. Since changes in ownership, operations, or use, might alter parking demand in the future, many ordinances that allow for shared parking require contingency plans to accommodate additional parking that may be necessary in the future.

Shared Parking – Montgomery County, Maryland

The Montgomery County Zoning Ordinance allows for shared parking when any land or building is under the same ownership or under a joint use agreement and is used for 2 or more purposes. The uses being served by the shared parking arrangement must be within a 500 feet walking distance of the shared parking facility. The number of parking spaces required under a shared parking arrangement in Montgomery County is calculated by the previous mentioned method.

The following is a generalized example of calculating the shared parking requirement for a mixed use development, given the regulations in the Montgomery County Zoning Ordinance. The calculations are based on a development project with general retail and office uses. The retail use has a gross floor area of 100,000 square feet and the office use has a gross floor area of 100,000 square feet. The development is located in the designated Southern Area of Montgomery County and is located 1,000 feet from a Metro station. Given this location, the minimum amount of parking normally required for a retail use is 5 spaces per 1,000 square feet gross floor area and the minimum requirement for an office use is 2.1 spaces per 1,000 square feet gross floor area. The following table summarizes the calculations. The "percentage of parking requirement column" is based on the parking credit schedule in the Montgomery County Zoning Ordinance.

	OFFICE USE			RETAIL USE			**Parking Requirement by Time Period**
	Minimum Parking Requirement	Percentage of Parking Requirement	**Adjusted Parking Requirement**	Minimum Parking Requirement	Percentage of Parking Requirement	**Adjusted Parking Requirement**	
Weekday Daytime	210	100%	**210**	500	60%	**300**	**510**
Weekday Evening	210	10%	**21**	500	90%	**450**	**471**
Weekend Daytime	210	10%	**21**	500	100%	**500**	**521**
Weekend Evening	210	5%	**10.5**	500	70%	**350**	**360.5**
Nighttime	210	5%	**10.5**	500	5%	**25**	**35.5**

For this example, the minimum parking requirement for the shared parking arrangement is **521 spaces** since that is the maximum number of spaces across the five time periods. This is significantly less than what would otherwise be required, 710 spaces, if shared parking were not permitted—a 26% reduction in the minimum parking requirement.

Parking Management Districts

Parking management districts are areas designated by local jurisdictions in which parking supply and rates are regulated to meet the parking needs of the area, at the same time as promoting transit use, ridesharing, and other alternative modes of transportation to the single occupancy vehicle. The two key components of parking management districts—supply management strategies and pricing policies—are designed to work together to enhance economic development and encourage a balanced transportation system in the parking management district. District-based supply management strategies are established to encourage mixed use development projects and areas and to ensure the maximum utilization of land, requiring less land area for parking and, in so doing, making more land available for tax-generating purposes. To complement these supply management strategies, district-based pricing policies are established to influence individual travel behavior and encourage alternative modes of transportation. These pricing policies are discussed in greater detail in the section of this paper on controlling parking demand.

With respect to district-based supply management strategies, the parking supply in parking management districts can be managed on a project-by-project basis or through the development of centralized, shared parking facilities. That is, some local jurisdictions manage parking supply in parking management districts by requiring parking ordinances for development projects located in the district. In applying for a parking

ordinance, developers must justify the parking levels that will be built as a part of the development project. For example, in Baltimore, Maryland, no land may be used as a parking lot nor may any building be razed so as to permit the use of the land as a parking lot unless authorized by an ordinance of the Mayor and City Council. This requirement is to permit the Mayor and City Council to consider and evaluate the need for the parking lot, the proposed appearance of the parking lot, and possible aesthetic damage to the area surrounding the parking lot, with particular respect to the proposed removal of historic or aesthetically valuable properties. By requiring a parking ordinance for development projects located in a parking district, jurisdictions can control the overall parking supply regulating on-site parking on a project-by-project basis.

Local jurisdictions can also manage parking supply in parking management districts by developing, operating, and maintaining publicly-owned, centralized parking facilities financed through fees in lieu and other methods described later in this paper in the section on parking financing. These facilities alleviate the need for individual development projects to provide parking on-site. For example, Montgomery County, Maryland, has established four parking management districts in Bethesda, Montgomery Hills, Silver Spring, and Wheaton. The purpose of each district is to support the comprehensive development of the central business district by providing, operating and maintaining economically self-sufficient parking facilities which keep pace with the needs generated by growth in each district. Moreover, the number of parking spaces provided in each district is carefully calculated given the desired modal split between private cars and transit. There are four major funding sources of the parking management districts including fees in lieu, parking receipts, enforcement revenues, and income from investments. By developing, operating, and maintaining centralized parking facilities, jurisdictions can control the overall parking supply, encouraging the shared use of off-site parking facilities by a variety of development projects.

Challenges to Limiting Parking Supply

There are several challenges to limiting parking supply through the above-mentioned strategies. Supply management strategies presuppose that the projected variations in parking demand are accurate, which is not always the case. Furthermore, changes in ownership or operations of existing uses, or future changes in land use, might alter parking demand. In case the projected parking demand proves inaccurate or changes over time and, as a result, projects generate a greater parking demand than originally anticipated, some local jurisdictions will only approve reduced minimum parking requirements or shared parking arrangements if the developer has an agreed upon plan to accommodate the additional spaces (Urban Land Institute 2000). Such plans might include land banks or landscaped reserves. For example, the Iowa City Zoning Ordinance allows for land banked areas to be used in place of up to 30% of the required parking. If at some point in the future, the additional parking spaces are needed, the property owner will be required to construct parking on the land banked area. Similar to Iowa City, Palo Alto, California, allows for land banked areas to be used in place of 50% of the required parking. However, in the case of Palo Alto, the land banked area is actually more appropriately called a landscaped reserve since the land must be landscaped or serve a recreational function such as a play area. Jurisdictions might also require developers' agreements and/or land covenants to ensure the continued implementation of agreed upon programs, irrespective of future ownership, operations, or change in use.

As discussed previously, parking maximums and areawide parking caps leave little room for mistakes in projecting parking demand. As a result, these policies must be somewhat flexible and regularly revised to ensure that an adequate level of parking is supplied. While some jurisdictions are revising local codes to incorporate maximums or areawide caps to complement minimum parking requirements, it is becoming more popular to replace minimums and maximums with more flexible parking medians. Under median parking requirements, a certain percentage of the median requirement is allowed above or below the median by right. Above or below this by right increase or decrease the developer must provide documentation to justify the levels of parking.

Overall, limiting parking supply might have unintended impacts should the actual parking demand exceed the anticipated level. If the parking supply is unable to accommodate demand, there might be spillover parking into adjacent uses and residential communities. In fact, many neighborhood residents will vehemently oppose any parking supply management strategy in fear that their neighborhood will become flooded by spillover parking with more cars bringing traffic and congestion. A potential solution to spillover parking is the creation and implementation of residential parking permit districts. Residential parking permit districts are designated areas in which the residents work with local jurisdictions to establish a program allowing them to park on the neighborhood streets, but restricts others from parking in these areas during certain hours. These districts are designed to reduce the impacts caused by students, customers, and

employees who do not park in the spaces provided in the nearby schools or businesses. In residential parking permit districts, permits could be made available to residents for a nominal fee—the revenues from these fees could in turn be used to fund neighborhood enhancements.

Finally, limiting parking supply will only be effective if there are concurrent efforts to control parking demand. Strategies to control parking demand, including transit investments, transit-oriented development and traditional neighborhood design policies, transportation demand management programs, unbundled parking, and pricing strategies, are discussed in this next portion of this section.

Controlling Parking Demand

One of the most effective ways of limiting parking supply is to reduce the needed supply through measures to control parking demand. In addition to the above mentioned supply management strategies, it is possible to reduce supply by influencing demand through investments in alternative modes of transportation, direct financial incentives for non-single occupancy vehicle use, pricing strategies, and policies supportive of transit-oriented development and traditional neighborhood design. This portion of this section outlines ways in which both the public and private sectors can influence parking demand, thus reducing the need for and subsequent provision of parking.

Transit Investments

One of the most effective ways of reducing the demand for parking is by providing people with a viable alternative to the personal automobile. Therefore, in seeking to control the demand for transportation facilities tailored to the automobile, the public sector must make a commitment to expand and otherwise improve transit systems and services. There are various ways in which transit systems could be improved to better meet the needs of existing users and potentially attract new users, including expanding already existing routes for existing modes, adding new routes for existing modes, and creating new modes such as express bus service. Capital investments could also be made to improve maintenance of facilities, such as buses and trains, and to revitalize transit stations, bus stops, and their surrounding neighborhoods. In addition to these capital investments in routes, modes, and facilities, operational improvements such as scheduling changes can be instituted to offer more frequent and convenient service. There are several challenges to these investments in transit. Capital projects may be extremely costly and demand a substantial upfront investment of government resources. Moreover, extensive planning and coordination is important to ensure appropriate location of routes and stations—this planning process adds additional time to what is already a time consuming process. As a result, it may take a long period of time before capital projects are fully operational. Finally, capital investments should be complemented by inducements such as marketing campaigns to help people realize the value of substituting mass transit for single occupancy vehicle use, improvements to fare structures, and enhanced passenger amenities.

MetroLink – St. Louis, Missouri

In July of 1993, MetroLink, a regional light rail system, began operating in St. Louis, Missouri. MetroLink's alignment stretches 34.3 miles from Lambert International Airport in St. Louis to Southwestern Illinois College in Belleville, Illinois. The system was built and is operated by Bi-State Development Agency as part of a fully integrated regional transportation system that also includes MetroBuses. The capital costs of the existing alignments was close to $800 million, of which the Federal Transit Administration paid about $600 million and the County governments paid the remaining portion. The federal contribution comes from its one-cent gasoline tax revenue base and covered all costs for design and engineering, construction, procurement, testing, start-up and project administration. The local match came from the asset value of the donated rights-of-way, structures, and facilities, and from a ½ cent sales tax. MetroLink operations are subsidized by sales taxes and passenger fares. The base fare is $1.25—service is free during lunch hours in the downtown district. In its first year of operation MetroLink carried nearly 9 million customers, almost double the projected ridership. In Fiscal Year 2001, 14.2 million customers rode MetroLink. It is estimated that 21% of MetroLink customers are former bus riders and the other 79% are new to transit. MetroLink has reduced vehicle miles traveled in the St. Louis region by as much as 139,100 miles per day, has saved 7,130 gallons of fuel each day, and in its first year of operation, reduced carbon emissions by between 4,500 and 9,600 metric tons (EPA TRAQ).

Transit-Oriented Development and Traditional Neighborhood Design Policies

To help foster pedestrian and transit friendly communities in which people do not need to rely exclusively on the personal automobile, local jurisdictions can develop policies that encourage transit-oriented development and traditional neighborhood design. Transit-oriented developments (TOD) are location-efficient, compact, walkable development projects with a balanced mix of residential, business, and institutional uses clustered around transit stations. Traditional neighborhood design (TND) developments are compact, mixed use, pedestrian-oriented communities that connect people to places and people to people. Both TODs and TND developments encourage the development of denser, mixed-use, pedestrian oriented areas where frequently visited services, jobs, housing, and, in the case of TOD, transit, are all easily accessible, reducing the reliance on the personal automobile and the subsequent need for parking facilities.

Although the benefits of TOD and TND have been well documented, there are still many challenges to both types of projects including community fears that increased densities will increase traffic congestion and lower property values, and developer and lender fears that TOD and TND projects have higher costs and risks than conventional development projects. Moreover, in many jurisdictions, existing codes and ordinances do not allow for the construction of mixed-use, pedestrian-oriented developments as alternatives to conventional use-segregated developments or require a prohibitive number of zoning variances.

Local jurisdictions can help enable TOD and TND by revising local zoning ordinances to include TOD and TND zones that allow for a mixing of uses and increased densities, can include affordable housing and reduced parking requirements, and prescribe design guidelines such as site development design criteria, street and streetscape design criteria, landscape design criteria, environmental standards, and scale requirements. Local jurisdictions can also help encourage TOD and TND projects by creating small area TOD and TND plans, making the necessary capital investments to support TOD and TND projects, and providing land assembly assistance and/or expedited permitting to developers wishing to undertake such projects.

Transit-Oriented Development Zoning – Concord, North Carolina

The Unified Development Ordinance of the City of Concord, North Carolina, designates transit-oriented development (TOD) districts to encourage a mixture of residential, commercial, and employment opportunities within a specified radius of identified light rail station or other public transit stations. The TOD zone allows for more intense and efficient use of land for the mutual reinforcement of public investments and private development in transit areas. The TOD zones are divided into two distinct subdistricts—TOD core and TOD periphery. All areas within ¼ mile of a transit station are classified as TOD core areas and all areas between ¼ and ½ mile of a transit station are classified as TOD periphery areas. The Unified Development Ordinance outlines different requirements for each of the subdistricts. The Ordinance allows for a mixing of residential and non-residential in both the TOD core and periphery areas, but does not prescribe the amount of land that needs to be allocated to each use. The Ordinance does regulate the density and floor area ratios in the TOD subdistricts. The following table illustrates this:

	Density (residential units per acre)		Floor Area Ratio (non-residential units)	
	Minimum	Maximum	Minimum	Maximum
TOD core				
Parcels, 2 acres or more	16	20	0.70	1.20
Parcels, less than 2 acres	12	16	0.50	1.00
TOD periphery				
Parcels, 2 acres or more	12	16	0.50	1.00
Parcels, less than 2 acres	8	12	0.30	0.60

The Concord Ordinance also details parking regulations specific to the TOD zones. More specifically, the Ordinance reduces minimum parking requirements in portions of TOD zones, stating that if a site is within 500 feet of a light rail alignment, the minimum required parking spaces is 50% of what otherwise would be required by the Ordinance. In addition, the Ordinance prohibits all surface parking facilities in the TOD core areas and allows for surface parking for only commercial uses in TOD periphery areas.

Traditional Neighborhood Design Zoning – Austin, Texas

The City of Austin's City Code allows for traditional neighborhood design by-right by designating traditional neighborhood zoning districts to encourage mixed use, compact, pedestrian-friendly development that diversifies and integrates land uses within close proximity to each other, and provides for the daily recreational and shopping needs of residents. As stipulated in the Austin Code, a traditional neighborhood district (TND) may consist of an area no less than 40 contiguous acres and not more than 250 contiguous acres. The City Code outlines five different types of areas in a TND—Neighborhood Center Area, Mixed Residential Area, Neighborhood Edge Area, Workshop Area, and Employment Center Area. The Code outlines different land use, site development, and design regulations for each type of area. A TND must have one Neighborhood Center Area and at least one Mixed Residential Area.

- A Neighborhood Center Area serves as the focal point of a TND, containing retail shops, offices, banks, a post office, places of worship, a community center, attached residential dwellings, and other uses that meet the daily needs of the residents. Townhouse, condominium, and multifamily uses shall be allocated not less than 20% of the land area, commercial uses shall be allocated not less than 20% of the land area, and civic uses shall be allocated not less than 5% of the land area in a Neighborhood Center Area. In addition, a Neighborhood Center Area is pedestrian-oriented, encouraging movement between the neighborhood center and Mixed Residential Area, and must include a public square.

- A Mixed Residential Area includes a variety of residential land uses including single-family homes, duplexes, townhouses, and apartments. Residential retail, commercial, and civic uses may also be located in a Mixed Residential Area. A Mixed Residential Area must include formal and informal open spaces and promote pedestrian activity. Single family residential use shall be allocated not less than 50% and not more than 80% of the land area, duplex use shall be allocated not more than 10% of the land area, townhouse, condominium, and multi-family uses shall be allocated not less than 10% of the land area, commercial uses shall be allocated not less than one percent and not more than two percent of the land area, and civic uses shall be allocated not less than two percent of the land area in a Mixed Residential Area.

In addition to a Neighborhood Center Area and at least one Mixed Residential Area, a TND may also have a Neighborhood Edge Area, a Workshop Area, or an Employment Center Area. A Neighborhood Edge Area is the least dense portion of a TND, with larger lots and greater setbacks than the rest of the area. A Workshop Area provides space for commercial and light industrial uses that are not appropriate for the Neighborhood Center Area, while an Employment Center Area provides space for large office and low-impact manufacturing uses.

Under the Austin City Code, formal and informal open spaces and an interconnected network of streets and alleys are all required components of a TND. More specifically, the Austin City Code requires that not less than 20% of the gross land area of the TND be open space and that overall impervious cover for a TND be limited to 65% of the net site area or the amount permitted in the watershed, whichever is less. The Code details impervious cover limits for each of the five types of areas as well.

Finally, the Austin City Code sets forth parking regulations specific to TND zones. Some of the more innovative TND parking regulations in the Code include the following: 1) A parking lot shall be located at the rear or side of a building (if at the side, appropriate screening must be provided; 2) A commercial use parking lot or garage must provide one bicycle parking space for every 10 motor vehicle parking spaces; 3) For parking in a Neighborhood Center Area, the required parking for a use may be located anywhere in the Neighborhood Center Area (community parking facilities are encouraged); 4) For parking in a Neighborhood Center Area, not more than 125% of the required parking for a use may be provided on-site; and 5) For parking in a Neighborhood Center Area, a commercial or a multi-family use may apply adjacent on-street parking toward the minimum parking requirements.

Transportation Demand Management Programs and Transportation Management Associations

According to Census 2000, it is estimated that 76% of workers sixteen years and over commute to work alone, 11% carpool, 5% take public transportation, and the remaining portion take another means or work from home. There are various reasons for this journey-to-work behavior—people may not live (or work) in an area that is within close proximity to transit service, people may want to have their personal automobile at work to perform errands or in case of emergency, or they may have off-site meeting during the day and need their personal automobile to get between the work place and the meeting site. In addition to these various and valid reasons, the provision of free parking at the workplace has clearly played a large role in influencing journey-to-work behavior. Most people want parking at work to be easily accessible and convenient so getting to and from the car does not add additional time to the workday. In response to these needs, free on-site parking has become a fringe benefit and a factor in the ability to recruit and retain employees.

Absent financial incentives for alternative travel modes to the single-occupancy vehicle and programs that alleviate the need for a personal automobile at work, solo driving will remain the overwhelmingly preferred mode of travel to work. Many employers and local jurisdictions have begun to implement transportation demand management (TDM) programs to influence travel behavior and induce people to take alternative modes to the personal automobile. TDM is a general term for programs that encourage a decrease in the demand for parking and other transportation tailored to the single-occupancy vehicle. TDM programs can either be employer-led programs designed to reduce the parking demand generated by employees, or publicly initiated programs to reduce the overall parking demand for all trips, not just journey to work trips. These programs might be direct financial incentives to use alternative travel modes or inducements such as preferential parking for carpools and vanpools, bicycle amenities, shuttles from peripheral parking locations and transit stations, and car sharing programs. Many of these programs are described in greater detail below.

- *Cash-Out Programs*. Many employers provide their employees with free on-site parking. Although employees do not see the costs of parking directly, these costs usually are passed on to all employees in the form of lower wages. Therefore, regardless of car ownership or journey to work mode, most employees end up paying for the costs of on-site parking facilities. In other words, employees who use alternative modes to the single occupancy vehicle in the end cross-subsidize those who drive to work alone. Many employers are now establishing and implementing cash-out programs to provide subsidized employees with a choice of receiving free parking or foregoing free parking for a cash payment equaling the cash equivalent of free parking, to use transit or other alternatives to the single-occupancy vehicle. As more and more employees opt for cash out, employers will likely require less and less parking. In fact, a Canadian study conducted by the Victoria Transport Policy Institute showed that cash out reduces parking demand by 15-25%. However, the effectiveness of cash out typically depends on the availability of transit and other alternative modes to solo driving and the availability, or lack thereof, of free and unregulated parking supplies, especially where employees could still park after taking the cash out rather than taking an alternative to the single occupancy vehicle. Moreover, cash out is not as effective in reducing solo driving as

Commuter Choice Maryland

Commuter Choice Maryland is a State-sponsored initiative to encourage employers to implement transportation demand management programs that reduce the use of single-occupancy vehicles. Commuter Choice Maryland programs can help employers save on taxes, reduce parking demand and costs, and recruit and retain valuable employees. Employers participating in Commuter Choice Maryland can develop a transportation demand management program tailored to their own individual needs—components of a Commuter Choice Maryland program might include employer-provided transit passes or vouchers, a vanpool program, a parking cash-out program, or a guaranteed ride home program. Employers implementing one of these programs through Commuter Choice Maryland can receive a Maryland state tax credit up to 50% for every dollar spent on commuter benefits programs. A maximum of $30 per participating employee per month applies to the state tax credit. In addition to the state tax credit, federal legislation passed as a part of the Transportation Equity Act of the 21st Century allows participating employers to offer federal tax-free commuter benefits to employees. As of January 1, 2002, tax-free benefits for transit and vanpool expenses can be offered in any amount up to $100 per month.

charging employees for parking with no other compensation. More specifically, according to a model developed by Donald Shoup at the University of California-Los Angeles, cash out is about two thirds as effective as charging for parking. Some local jurisdictions may enact ordinances to require employers who offer subsidized parking to offer eligible employees the option of taking the cash equivalent of free parking, while other jurisdictions leave it up to the employer as to whether or not they will implement a cash-out program. Finally, it is important to note that cash-out is different from transit subsidies, which are direct payments to employees for use of public transportation and usually equal the cost of a monthly pass or a portion thereof.

- *Peripheral Parking with Shuttles*. Local jurisdictions and employers may wish to provide peripheral parking locations outside the main activity center and offer shuttle service from those locations to the main core and employment sites. Local jurisdictions and employers might also wish to provide shuttle service from transit stations to employment sites that are located in areas that are not well-served by mass transit. Providing shuttle service from peripheral parking locations may not be effective in reducing single-occupancy vehicle use or overall parking demand, it might just shift where the necessary parking spaces are actually located from the main activity center to a more peripheral location. However, providing shuttle service from transit stations to employment sites can help reduce single-occupancy use and parking demand since people living in close proximity to a transit station will now have a viable alternative to driving to work. Shuttle service could also provide guaranteed ride home on an as needed basis.

- *Preferential Parking for Carpools and Vanpools*. In privately owned parking facilities developers or employers might provide incentives for alternative modes of travel to the single occupancy vehicle by reserving close-in, secure, covered, or otherwise preferable parking spaces for high-occupancy vehicles. Local jurisdictions can do the same in publicly owned facilities and might consider enacting legislation to require operators of privately owned facilities to do so. For example, the Portland Municipal Code requires for office, industrial, and institutional uses where more than 20 parking spaces are required that 5 spaces or 5% of the spaces, whichever is less, must be reserved for carpools. Moreover, the carpool spaces must be the closest spaces to the building entrance

Downtown Area Shuttle – Baltimore, Maryland

In March of 2002, Downtown Partnership of Baltimore began operating an employee shuttle program—the Downtown Area Shuttle (DASH). DASH service provides Downtown employees with access to over 1,200 parking spaces near Ravens Stadium and a convenient, reliable commuter bus connection to various employment sites and the core of Downtown Baltimore. The monthly fee for the use of the parking facilities at Ravens Stadium and the shuttle service is $50. Employees that carpool are charged a monthly rate of $20. Currently, this monthly program is only available to employees whose employers have contracted with Downtown Partnership. Other Downtown employees, residents, and visitors can ride the shuttle throughout Downtown for a 50-cent fare, but will not be able to park in the Ravens Stadium parking lots.

Triangle Transit Authority Rideshare Program – Greater Triangle Region, North Carolina

The Triangle Transit Authority (TTA), a regional public transportation authority serving Durham, Orange and Wake Counties in North Carolina, offers a rideshare program to provide vanpool and carpool services. In particular, as a part of the vanpool program, TTA provides a 15-passenger van to no fewer than seven commuters who live and work near each other and who share approximately the same work schedule. In addition to the vehicle, TTA pays for gas, and arranges and pays for maintenance. Vanpool riders pay a monthly fare based on monthly mileage. For example, a vanpool with a total monthly mileage of 520 miles pays in total $500.45 (or $35.75 per person based on a vanpool of 14). A vanpool with a total monthly mileage of 3145 miles pays in total $1,299.68. TTA offers a seat subsidy program to encourage the formation of vanpools. The rideshare program, among other TTA services and programs, is funded by a vehicle registration tax of up to $5 per registration, authorized by the North Carolina General Assembly in 1991, in addition to program revenues.

or elevator, but not closer than parking for the disabled. Local jurisdictions and employers could also promote carpooling or vanpooling by subsidizing vehicles or fuel costs.

- *Bicycle Facilities and Amenities*. Employers can encourage bicycling by providing bicycle parking or storage, showers, and lockers on-site. Local jurisdictions should consider requiring bicycle parking in zoning ordinances and reducing minimum parking requirements given the provision of bicycle parking over the required amount. For example, the Portland Municipal Code requires a minimum number of short term and long term bicycle spaces for residential and non residential uses. These requirements are intended to help meet the City's goal that 10% of all trips be made by bicycle. Moreover, bicycle parking may substitute for up to 25% of the required automobile parking—for every 5 non-required bicycle parking spaces, the automobile requirement is reduced by one space.

- *Car Sharing*. Both the public and private sector in the United States are beginning to follow Europe's lead in instituting car sharing programs to grant residents or employees access to a car when they need it without incurring the fixed costs associated with owning and operating a personal automobile. According to Zipcar, a privately owned car sharing company, each car sharing vehicle replaces four to eight privately owned cars, thus reducing parking demand. Moreover, car sharing reduces vehicle miles traveled, thereby, helping to alleviate traffic congestion and improve air quality. According to the Victoria Transport Policy Institute, car sharing is most effective in high-density, mixed-use areas where there are a variety of travel choices, flexible parking requirements, and transportation management associations that encourage employers and employees to use alternative travel modes to the single-occupancy vehicle. In car sharing arrangements, vehicle fleets are located in various areas throughout the jurisdiction, usually at transit nodes or in commercial districts. Residents can pay an annual membership fee and reserve a car by phone or on-line typically up to a year in advance. Members are then charged based on usage. This rate typically covers gas, maintenance, insurance, and parking. Some local jurisdictions are beginning to promote car sharing by reducing minimum parking requirements when developers or employers institute or participate in car sharing programs. For example, the Seattle Municipal Code allows for up to 5% of the total number of parking spaces provided in a project to be used to provide parking for vehicles operated by a City-recognized car sharing program. The number of required spaces may be reduced by one space for every parking space leased by a City-recognized car sharing program.

Car Sharing Programs in Washington D.C.

In December of 2001, the Washington Metropolitan Area Transit Authority (WMATA) launched a new car sharing program in the Washington D.C. area. WMATA is partnering with Flexcar, a privately owned, national car sharing company, to make cars available for hourly rental at or near selected Metro stations 24-hours-a-day, seven-days-a week. Flexcar charges a one-time $25 member initiation fee and offers different payments plans, including hourly and mileage rates, based on user needs and usage. One option charges members a monthly fee of $35 for 5 hours, while another option charges a $525 monthly fee for 100 hours of use. Flexcar currently has 36 cars at 21 locations in the Washington region and has over 500 approved members. The program has plans to expand to 200 cars by 2003 to keep pace with the increasing demand. Local jurisdictions in the Washington region are helping to ensure the success of car sharing programs. In Arlington County, Virginia, the County's Commuter Assistance Program is offering a $500 subsidy for businesses to join Flexcar or Zipcar, another for-profit car sharing company operating in the Washington region. The City of Alexandria, Virginia, will reimburse up to $105 of membership and application fees for residents and up to $50 for business membership fees and half of each employee's application fee up to $20 for membership to Flexcar or Zipcar.

As stated previously, TDM programs can be employer-led or publicly-initiated programs. However, it is becoming more common for TDM programs to be administered by transportation management associations. In fact, transportation management associations play an integral role in garnering support for and implementing demand management programs and district-based parking management strategies.

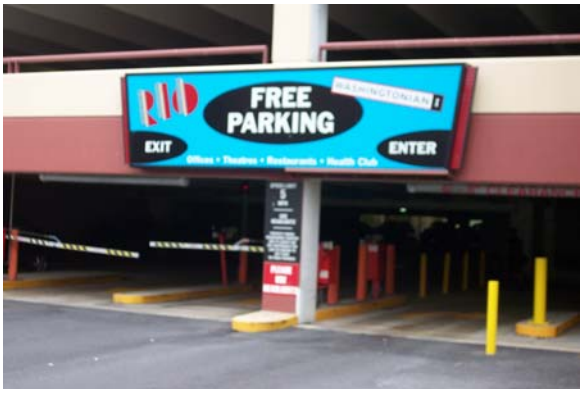
Transportation management associations are independent, non-profit, member-controlled organizations that bring together employees, retailers, business owners, public sector representatives and others to address transportation issues and provide transportation services in a particular area. The main objectives of transportation management associations are to improve air quality, circulation, and the attractiveness of the urban environment through the promotion of alternative modes to the single-occupancy vehicle. To achieve these objectives, transportation management associations might provide discounted transit passes, shuttle bus services from off-site parking facilities, guaranteed ride home programs, bicycle facilities, car sharing programs, and information kiosks.

Unbundled Parking

The costs of parking are often bundled into the rent or purchase price for residential and commercial units and buildings. This practice assumes that all tenants and owners have the same parking demand; therefore, regardless of car ownership all tenants and owners bear the costs of parking through increased rents or inflated purchase prices. Including costs of parking in rents and purchase prices encourages automobile ownership and is a disincentive for using alternative transportation modes. On the other hand, separating the payment of parking from the rent payment or purchase price, also known as "unbundling", can provide a more equitable allocation of costs by allowing tenants and owners to pay only for the parking they use and can reduce parking demand by making households pay the full cost of parking. Given that unbundling can reduce parking demand, development projects that unbundle parking or provide rebates to households who own fewer or no vehicles and will not use their allotted parking space or spaces could provide less parking than what otherwise might be required.

Pricing Strategies

One of the simplest ways to reduce parking demand is to charge users directly for the cost of parking. That is, parking prices for on-street meters and off-street parking facilities can be set to alter the cost of driving solo relative to travel alternatives, thereby influencing travel choice and reducing parking demand. In fact, according to the Victoria Transport Policy Institute, parking pricing typically reduces parking demand by 10-30% compared to unpriced parking. There are various ways in which operators of publicly owned and privately owned parking facilities can price parking to differentiate prices among different users to achieve economic, strategic, and policy objectives. Such pricing strategies include time-based pricing, vehicle occupancy pricing, and vehicle size pricing.



A sign on a parking garage in Gaithersburg, Maryland, advertises free parking, encouraging automobile use.

- *Time-Based Pricing*. Time-based pricing can be implemented in on-street parking and off-street parking facilities to discourage long-term commuter parking and encourage turnover, which is usually necessary for parking facilities to cover costs and earn a reasonable return. More specifically, meter rates and parking prices in lots and structures can be set to increase over time to variable rates that become more expensive for each additional hour.

- *Vehicle Occupancy Pricing*. Vehicle occupancy pricing can be established in off-street parking facilities to encourage the use of high occupancy vehicles. More specifically, rates can be set at or above market rates for solo drivers, while carpool or vanpool rates are discounted or free.

- *Vehicle Size Parking*. Vehicle size parking can be established in off-street parking facilities to encourage the use of compact cars, which demand a smaller land area for parking. More specifically, rates can be set at or above market rates for sport utility vehicles and other vehicles that might take up more than one space and can be set below market rate for compact vehicles.

To complement these parking pricing strategies, local jurisdictions could levy parking taxes on operators of off-street parking facilities. These taxes are typically passed on to users in the form of higher parking rates. For example, in Baltimore, Maryland, the Baltimore City Parking Authority collects a parking tax equal to

11% of a parking facility's gross transactions and $14 per month per monthly user. Moreover, local jurisdictions could implement and enforce time limits on meter parking to encourage turnover in commercial districts and discourage long-term commuter parking.

There are several challenges to implementing parking pricing, parking taxes, and time limits. First of all, it is generally difficult to impose parking pricing where parking is currently free. Moreover, if there are uncontrolled parking supplies nearby, users can circumvent paying for parking and park in those available spaces. Finally, as discussed previously in this paper, pricing strategies should only be implemented in areas where there is a viable alternative to the personal automobile and where the market is sufficiently strong so that pricing will not lead to economic dislocation.

Challenges to Controlling Parking Demand

The biggest challenge to controlling parking demand is that despite investments in transit infrastructure, parking pricing policies, and other demand management strategies, many people will still choose the single occupancy vehicle as their primary travel mode. Since the middle of the last century the American public indeed has had a love affair with the personal automobile—it is entrenched in the American way of life. Getting people to change their behavior has proven rather difficult. Demand management strategies must be complemented with aggressive marketing campaigns and education and outreach efforts to make people realize the value of substituting alternative modes to the personal automobile. Moreover, in developing and revising parking policies and programs, both the public and private sectors need to engage all of the stakeholders in the process so that the general public has a sense of collective responsibility over the success of such policies and programs. The following section is a summary of some of the supply and demand managements strategies proposed in this section that the public and private sectors might wish to include in parking policies and programs.

Possible Strategies

Local Jurisdictions

- Conduct a comprehensive review of parking requirements.
- Reduce parking requirements for specific locational and demographic factors.
- Reduce parking requirements when TDM programs are implemented.
- Reduce parking requirements in exchange for fees in lieu.
- Adopt maximums to complement minimum parking requirements or establish parking medians.
- Allow for shared parking at mixed-use development projects and in mixed-use areas.
- Designate parking management districts and develop area parking management plans for those districts. Parking management plans might include areawide parking caps, regulation of on-site parking facilities through parking ordinances, shared parking arrangements, construction of centralized publicly owned parking facilities, and pricing strategies.
- Allow landscaped reserves to meet parking requirements.
- Establish residential parking permit programs.
- Revise local zoning ordinances to create transit oriented development and traditional neighborhood design zones that allow a mixing of uses, increased densities, affordable housing, reduced parking requirements, and pedestrian oriented and environmentally friendly design.
- Enact ordinances to require employers who offer subsidized parking to offer eligible employees the option of taking the cash equivalent of free parking.

- Form public-private partnerships to provide shuttle service from peripheral parking locations and transit stations to employment site and the central business district.
- Require a certain percentage of spaces to be designated for carpools or vanpools.
- Form public-private partnerships to provide vanpool services or car sharing programs.
- Require development projects to include bicycle parking and reduce minimum parking requirements given the provision of bicycle parking over the required amount.
- Encourage unbundling of housing and parking costs.
- Set parking prices in municipal structures to benefit priority users such as high occupancy vehicles and compact cars.
- Implement time-based pricing to set prices higher during peak periods and increase over time.
- Provide signs, maps, and brochures to provide accurate information to users on parking facilities and availability.
- Elicit public involvement and include all stakeholders from the start in planning parking policies and programs.

Developers

- Provide an appropriate amount of parking given carefully estimated parking demand, as opposed to oversupplying parking.
- Seek opportunities to share parking between uses within a development project or with complementary uses in close proximity.
- Pursue transit-oriented development and traditional neighborhood design projects to create compact, mixed-use, pedestrian-friendly, walkable communities with viable alternatives to the personal automobile.
- Reserve close in, secure, covered, or otherwise preferable parking spaces for carpools and vanpools.
- Provide bicycle parking facilities including racks and lockers.
- Unbundle the cost of parking from the rent or purchase price of residential and commercial units or buildings.
- Charge users for the cost of parking and set parking rates to benefit priority users such as high occupancy vehicles and compact cars.

Employers

- Offer employees eligible for subsidized parking the option of taking the cash equivalent of free parking.
- Provide transit subsidies or discounted transit passes.
- Work with the public sector and/or other area employers to provide shuttle service from peripheral parking locations and/or transit stations.
- Work with the public sector and/or other area employers to develop and implement vanpool or car sharing programs.
- Reserve close in, secure, covered, or otherwise preferable parking spaces for carpools and vanpools.

- Provide bicycle parking facilities including racks and lockers and provide bicycle amenities such as showers and clothes lockers on-site.
- Implement a guaranteed ride home program.
- Provide information kiosks or bulletin boards to inform employees of ridesharing opportunities and programs.
- Charge users for the cost of parking and set parking rates to benefit priority users such as high occupancy vehicles and compact cars.

PARKING DESIGN

Since the advent of the personal automobile, the American landscape has become predominantly a habitat for cars, with streets, parking facilities, and other auto-oriented uses dominating the built environment. Parking facilities in particular have become an omnipresent feature of the American landscape, consuming land and resources, inhibiting the functioning of natural systems, creating dead gaps in what otherwise might be vibrant commercial areas, and creating conflicts between vehicles and pedestrians and bicyclists. This adverse impact on the walkability of communities is a particular challenge to creating lively, mixed use places with a unique sense of identity—attractive places where people want to linger, to gather, and to return over and over. It is precisely these kinds of walkable places that are essential to the success of smart growth development strategies.

This section of this paper proposes best practices to reverse the negative impacts parking facilities have traditionally had on the environment and the character of urban places. The best practices outlined in this section are organized by the objective each strategy or "practice" aims to achieve. The five main overarching objectives are:

- Design sites such that vehicles are not the dominant feature;
- Provide necessary parking without large expanses of pavement;
- Minimize runoff from parking lots utilizing techniques to return surface water to the ground;
- Encourage vibrant street level activity; and
- Create a safe and comfortable environment for pedestrians and bicyclists as well as vehicles.

The three types of parking facilities—on-street parking, surface parking lots, and parking structures—are each appropriate in different settings and under different circumstances, and all play integral roles in shaping the character of the built environment. For each proposed best practice, the type of parking the strategy applies to is listed. The final portion of this section briefly discusses some of the challenges to implementing smart parking design best practices.

OBJECTIVE: Design sites such that vehicles are not the dominant feature.

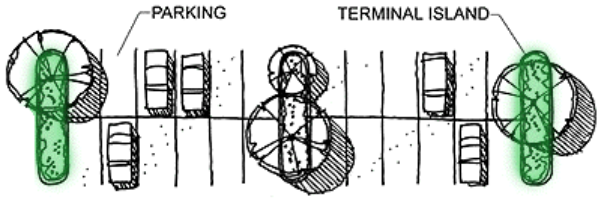
No one wants acres of pavement or blank walls dominating the streetscape, yet parking needs to be convenient, safe, and accessible. Given the adverse impacts of the visual prominence of parking facilities, local jurisdictions and developers alike should seek innovative design strategies to ensure that parking facilities do not become the dominant feature of the streetscape. The following are some best practices that might be considered.

- *Location*. The location of parking facilities behind buildings is vital in creating more welcoming and pedestrian-friendly streetscapes that will attract users over and over again. The desire for safe, convenient, and accessible parking has typically led to the placement of parking areas in front of buildings. For example, in retail projects, shoppers typically want to enter and exit the parking facility with ease and want to avoid the frustration and stress associated with having to drive around and look for parking. In response to these needs, developers have typically provided parking areas in front of retail uses where it is highly visible and readily available. However, the placement of parking facilities in front of buildings has an effect on people as they walk or even drive by. Parking facilities in front of buildings create physical and psychological barriers to the building, as opposed to buildings placed close to the street, framing the public space and inviting people in. Indeed, from an urban design perspective, parking considerations should be secondary to the design and placement of buildings on the site. Parking facilities can be located in the interior of blocks and concealed by "liner" buildings with retail, offices, and housing. Parking is then

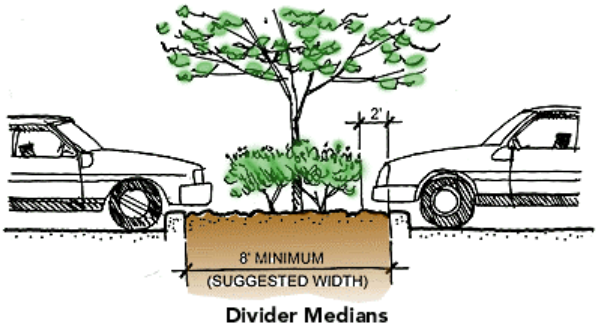
This parking structure in Bethesda, Maryland, is embedded in the block, obscured from street activity by more active uses.

found behind the building, accessible yet out of view. Signage could be used to direct users to the parking facility. And since for safety reasons developers typically want a single entrance, wayfinding will have to incorporated to get people from the parking area to the entrance, which may be in the front of the building. Moreover, on-street parking could be provided in the front of the building to provide visible and convenient auto access.
Applicability: Parking lots and structures

- *Screening and Landscaping*. As discussed previously, if at all possible, parking facilities should be placed behind buildings in the interior of blocks. For facilities placed to the front or side of buildings, there are various ways to screen parked cars from street level activity, thereby providing the necessary parking without overly compromising urban design. Parking facilities, including lots and structures, could be located where the site topography can help conceal them. Integrating parking facilities into site topography might also limit the impact a project may have on the functioning of natural systems. With respect to parking lots, when a parking lot abuts a public street the parked cars should be screened from public street frontage to obscure a majority of the parked cars. Screening can be continuous landscaping, attractive fencing or stone walls, among other materials. Overall, the buffer between the parking lot and the street should be no less than 15 feet wide—this liberal width should help to encourage the placement of parking lots behind buildings versus along the street. Finally, landscaping on the periphery of a parking facility and within parking areas can be used to soften the appearance of a parking facility from the street. More specifically, expanses of parking should be broken up with landscaped islands and planted strips, which include shade trees and shrubs. Such landscaping provides a canopy cover and reduces the urban heat island effect in the summer. Landscaping not only provides shade on hot days, absorbs carbon dioxide, and reduces pollutants emitted by vehicles as they sit in the sun, but also breaks up the visual impact, making the parking lot feel smaller and less overwhelming.
  Applicability: Parking lots and structures



Terminal Islands



Divider Medians

These two figures from the Henderson (Nevada) Development Code illustrate two parking lot landscaping techniques—terminal islands and divider medians. According to the interior parking lot landscaping standards in the Code, terminal islands must be provided at the end of each parking row, and divider medians between abutting rows of parking spaces are encouraged. Moreover, the Code stipulates the following: 1) for parking lots with 5-100 spaces, 1 tree must be planted for every 10 spaces; 2) each parking space must be located within 40 feet of a tree; and 3) at least 10 percent of the interior area of a parking lot must be devoted to landscape planting areas.

- *Architectural Treatments.* With respect to parking structures, there are various ways to help integrate parking structures with their surroundings, particularly through scale, materials, colors, and style. Architectural treatments can be used to screen cars and relate to the design of adjacent buildings. The architectural treatments should be divided into 30' increments to better integrate the parking structure with the scale and character of adjacent buildings and to provide the visual breaks to hold the interest of walkers passing by. Façade elements around the entry to the structure should be emphasized to reduce the visual prominence of the structure entry.
  Applicability: Parking structures

OBJECTIVE: Provide necessary parking without large expanses of pavement.

According to the Center for Watershed Protection, as much as 65% of the total impervious surface cover in the American landscape are surfaces designed for cars including, but not limited to, streets, parking lots, and

driveways. The paving over of the American landscape is clearly unsustainable, consuming land and resources and creating huge volumes of stormwater runoff that tax the capacity of sewer systems and degrade water quality in streams and other waterways. Local jurisdictions and developers alike should determine ways in which they can provide the necessary parking, while minimizing the amount of acreage that is converted to parking. The following are some best practices that might minimize the amount of pavement required for a parking facility while allowing the most cars to park on the site.

- *Provision of On-Street Parking*. On-street parking provides convenient access to adjacent uses and provides the best possible option to visitors since it offers the shortest possible time between stopping and shopping. Moreover, the provision of on-street parking can lessen the need for parking lots and structures, which convert a significant amount of acreage to parking. There are three different types of on-street parking—head-in, angle, and parallel. Each type of on-street parking has its pros and cons. Both head-in and angle parking can provide for more cars than a parallel parking configuration, but both require a considerable amount of right-of-way and, therefore, necessitate wider streets. Moreover, both head-in parking and angled parking create the potential for a greater number of traffic accidents, as drivers must back out of spots into the flow of traffic. Therefore, both of these types of parking are best designed on streets with slow moving traffic. On the other hand, parallel parking decreases the potential for accidents and requires a narrower right-of-way; however, parallel parking accommodates fewer cars than the other types of on-street parking. While on-street parking—head-in, angled, or parallel—may not fully accommodate the amount of parking necessary, it does provide visible and convenient auto access and can satisfy short-term parking needs. To complement on-street parking, development projects can incorporate other parking facilities, namely surface lots and structures, to accommodate longer-term parking needs.
  Applicability: On-street parking

King Farm, a New Town in Rockville, Maryland, utilizes on-street parking to accommodate required parking spaces and alleviate the need for parking lots and structures. This street uses both parallel parking and angled parking.

- *Construction of Structures Rather Than Lots*. Building vertically reduces the acreage of land converted to parking, thereby, reducing impervious surfaces. However, the type of parking facility—lot or structure—in a development site is usually determined by balancing the cost of land against the cost of constructing parking. In urban areas where land costs are at a premium, it is more cost-effective to build a parking structure than to build a surface parking lot. In suburban areas, the availability and low cost of land make surface parking lots more cost effective than parking structures. In these suburban areas, absent significant incentives to defray the costs of structured parking, it is unlikely that structured parking will become the norm. The following section of this paper on parking financing outlines some incentives and financing programs for structured parking.
  Applicability: Parking structures

Washingtonian Center, a retail and entertainment center in Gaithersburg, Maryland, includes a large structured parking facility to accommodate the necessary parking. This view is of the back of the structure; the front of the structure incorporates retail uses on the first floors.

- *Automated Parking Structures.* Automated parking structures have the potential to change the dynamics of land use, significantly reducing the demand for land devoted to parking and making more land available for revenue generating purposes. Automated parking can squeeze up to two times the number of cars in the same space as a conventional garage or, in other words, accommodate the same number of cars in half the space, and can be built on a site as small as 60 feet by 60 feet, in structures up to 20 stories high, above or below ground. These facilities are able to be so space-efficient because they operate using a computerized network of rails and pallets that lift and carry cars from the entrance bay to available slots with no human intervention. In addition to reducing the amount of land devoted to parking, there are many other benefits to automated parking. Automated parking makes parking safer and more convenient, eliminating the risk of car damage, theft, or personal injury, and reducing the water and air pollution attributed to exhaust fumes and impervious surfaces. Moreover, automated parking structures have complete flexibility in the design of the façade; therefore, they can be easily incorporated into existing urban design. In terms of costs, automated parking is now becoming a price-competitive and viable alternative to traditional ramp garages, as land costs in urban areas are at a premium. Automated structures have lower land acquisition costs since they require less land, construction costs are typically about the same as conventional above ground structures, and operating costs are somewhat lower since many automated structure are completely computerized and only require one person on-site. One potential drawback to automated parking is that it might make parking too efficient, leading to an increased driving demand.
  Applicability: Parking structures

- *Reduced Stall Dimensions and Compact Car Spaces*. Reducing the size of parking stall dimensions overall and dedicating a certain percentage of stalls to compact cars can reduce impervious surface cover. While the trend toward larger sport utility vehicles is often cited as a barrier to implementing stall minimization, stall width requirements in most local ordinances are much larger than the widest sport utility vehicles (Center for Watershed Protection). Reducing stall dimensions and dedicating compact car spaces will only be effective in reducing the footprint of parking structures if the number of parking spaces per floor is limited and additional spaces are accommodated by building additional floors.
  Applicability: On-street parking and parking lots and structures

- *Tandem/Stacked or Valet Parking*. Providing the required parking spaces in tandem or stacked parking arrangements or offering valet parking service reduces the amount of land devoted to parking. The City of Portland, Oregon, allows stacked parking or valet parking if an attendant is present to move vehicles. If stacked parking is used for required parking spaces, some form of guarantee must be filed with the City of Portland to ensure that an attendant will be present when the parking facility is in operation.
  Applicability: Parking lots and structures

- *Alternative Pavers*. Utilizing alternative pavers that permit water to penetrate reduces the overall impervious surface coverage and creates less stormwater runoff. Alternatives to concrete and asphaltic concrete include gravel, cobble, wood mulch, brick, grass pavers, turf blocks, natural stone, pervious concrete, and porous asphalt. Alternative pavers may not be ideal depending on site-specific characteristics such as climate, soil type, and traffic volume. However, they are recommended for overflow areas and can be used in cross walks and stalls to create a break in the paved area, thereby, facilitating groundwater recharge.
  Applicability: Parking lots

The use of alternative pavers in overflow areas reduces impervious surface coverage and helps facilitate groundwater recharge.
***Credit*: Center for Watershed Protection**

- *Multiple Lots*. Breaking up large parking lots into two or more areas can reduce the total amount of impervious surface and disconnect paved surfaces, thereby reducing stormwater runoff and facilitating

groundwater recharge. This practice also breaks up the perceived visual mass of parking facilities and can help to integrate "big box" uses, such as grocery stores, into neighborhood shopping districts.
Applicability: Parking Lots

OBJECTIVE: Minimize runoff from parking facilities utilizing techniques to return surface water to the ground.

Parking facilities have serious impacts on the functioning of natural systems, depleting the water supply and degrading water quality. Traditional stormwater management systems carry and discharge runoff from parking facilities directly into streams and rivers, thereby preventing ground water recharge and dumping pollutant loads into our waterways. Local jurisdictions and developers should seek innovative ways to manage stormwater runoff that support the functioning of natural systems. The following are some best practices that might be considered. Some of these practices may be more expensive upfront than traditional approaches; however, the costs may be offset by the reduced need for stormwater facilities and reduced maintenance costs.

- *Low Impact Development Techniques*. Local jurisdictions and developers are increasingly turning to Low Impact Development (LID) techniques to manage stormwater on-site. In particular, LID techniques can be critical in controlling the quality and quantity of stormwater runoff generated from the impervious surface of parking facilities. LID uses a wide array of methods to retain, detain, filter, recharge, and pass runoff through decentralized, distributed, small-scale controls to reestablish the predevelopment volume of runoff, recharge, storage, and evaporation on a development site. Ultimately, LID seeks to protect and restore important ecological and hydrological functions. Major components of LID include: 1) conservation of forests, natural vegetation, streams, wetlands, and open space, to the greatest extend practicable; 2) minimization measures including reduced clearing and grading, saving infiltratable soils, reducing or disconnecting impervious surfaces, reforesting, and reducing the use of pipes, curbs, and gutters; 3) concentration of runoff in open drainage systems and vegetative swales to slow down runoff, reduce discharges, and encourage more infiltration and evaporation; 4) integration of retention, detention, filtration, storage, and capture of runoff systems into the site; and 5) promotion of pollution prevention measures. With respect to parking facilities, common LID techniques used to control stormwater runoff include open sections, swales, and bioretention areas. Open sections encourage sheet flow to open channels where pollutants are removed through infiltration and vegetation/soil filtering prior to discharge, as opposed to the traditional curb and gutter methods that convey stormwater runoff and associated pollutant loads into streams. Vegetative swales direct stormwater into shallow bioretention areas that temporarily detain the water, facilitating infiltration into the subsurface and slowing and cleaning the remaining stormwater before it is discharged into waterways. Proper plant material selection is critical to the success of these measures. The effective use of LID techniques can significantly reduce the cost of providing stormwater management by eliminating the use of costly stormwater management infrastructure including ponds, pipes, curbs, gutters and roadway paving, among others. In fact, LID can reduce stormwater and site development design construction and maintenance costs by 25-30% compared to conventional approaches (Prince George's County Department of Environmental Resources).
  Applicability: Parking lots

- *Green Roofs*. Some developers of parking structures are beginning to incorporate green roofs on parking structures to retain and naturally filter stormwater runoff, thereby improving water quality. According to Roofscapes, Inc., green roofs can retain 50-60% of the total annual runoff volume of a roof, reducing the need for costly stromwater management systems. Underground parking structures often have lawns and parks planted on top. Above ground parking structures could also incorporate roof systems of vegetation, soil, drainage, and waterproof membranes to alleviate environmental problems including storm water runoff and the urban heat island effect. Additional benefits of greenroofs include improved livability of the urban environment by buffering noise, reducing glare, and offering an aesthetic alternative to asphalt roofing. Green roofs are more costly than traditional roof systems; however, the associated costs could be offset by the reduced need for stormwater facilities.
  Applicability: Parking structures

OBJECTIVE: Encourage vibrant street level activity.

Local jurisdictions and developers often view parking facilities as generators of economic development, as adequate parking can enhance the marketability of development projects to tenants and customers. However, the inappropriate location and unattractive design of parking facilities can actually constrain economic development, creating dead gaps of inactivity in what otherwise might be vibrant commercial environments. Local jurisdictions and developers should seek ways in which the necessary parking can be accommodated, at the same time as the street activity is enlivened. The following are some best practices that might be considered.

- *Provision of On-Street Parking*. On-street parking can play a vital part of a streetscape, fostering a more vibrant pedestrian commercial environment. More specifically, on-street parking provides a mental and physical buffer between pedestrians on a sidewalk and cars on a busy street. The public safety aspects of on-street parking are discussed in greater detail under the following objective on creating a safe and comfortable environment for pedestrians and bicyclists as well as vehicles.
  Applicability: On-street parking

Bethesda Row, a mixed-use retail and entertainment project in Bethesda, Maryland, incorporates on-street parking to foster a more vibrant pedestrian commercial environment.

- *Location*. Parking lots and structures should be located behind buildings rather than in front of them so they do not dominate street frontage, thereby creating a more welcoming pedestrian-friendly streetscape. The location of parking facilities was discussed in greater detail under the objective on designing sites such that vehicles are not the dominant feature.
  Applicability: Parking lots and structures

- *Retail and Commercial Uses*. Parking structures with frontage along streets should provide retail and commercial uses along the street in order to enhance the pedestrian experience and create street level activity. Newsstands and coffee shops typically are successful, in addition to government offices, particularly public safety and police sub-stations, which act as crime deterrents. Incorporating retail and commercial uses in parking structures has the added benefit of generating additional sources of revenue through the lease or sale of space. This is discussed in greater detail in the section on parking financing.
  Applicability: Parking structures

Washingtonian Center in Gaithersburg, Maryland, incorporates retail and commercial uses on the first floor of the parking structure.

OBJECTIVE: Create a safe and comfortable environment for pedestrians and bicyclists as well as vehicles.

Cars are typically at odds with pedestrians and bicyclists on the roadway—and this is no different in parking facilities. Local jurisdictions and developers should seek design strategies to ensure pedestrian and bicycle safety, without compromising the safe and expeditious movement of cars. The following are some best practices that might be considered.

- *Provision of On-Street Parking*. On-street parking is typically used in tandem with other street design elements to ensure the safe co-existence of vehicles, pedestrians, and bicyclists.

Such street design elements are commonly referred to as traffic calming measures. Traffic calming is a method of reducing traffic speeds and volumes and/or cut through traffic by instituting both physical measures such as traffic circles, speed humps, chicanes, and chokers, and operational measures such as increased police enforcement, speed displays, and community speed watch programs. Ultimately, these traffic calming measures are intended to reduce the negative effects of motor vehicle use and improve conditions for non-motorized street users such as pedestrians and bicyclists. On-street parking is one type of traffic calming measure and can be used in tandem with other measures to slow vehicle traffic and provide a buffer between moving cars and pedestrians and bicyclists.
Applicability: On-street parking

- *Limit Curb Cuts*. Curb cuts tend to increase pedestrian exposure to moving vehicles, limit opportunities for landscaping, eliminate on-street parking spaces, and aggravate traffic control. Limiting the number of curb cuts can help ensure pedestrian and bicycle safety, while allowing for safe and expeditious movement to and from the street system.
  Applicability: Parking lots and structures

- *Pedestrian Corridors*. Pedestrians should not have to walk through parking facilities where they must be on constant guard for moving vehicles. Parking facilities should incorporate a clearly defined pedestrian pathway from the public sidewalk, bus stops and on-street parking, through parking lots, to building entrances. The pedestrian pathway should be landscaped and or delineated by non-asphaltic material in a different color or texture from the parking area to enhance pedestrian safety and improve the appearance of the parking lot. Pedestrian pathways through parking areas to stairwells and elevators should also be incorporated in parking structures.
  Applicability: Parking lots and structures

Surface parking lots at King Farm in Rockville, Maryland, incorporate brick pavers to distinguish pedestrian walkways from the parking area.

- *Pedestrian and Bicycle Entrances*. Enhancing the pedestrian and bicycle entry to parking lots and structures helps buffer pedestrians and bicyclists from cars and reduce the relative importance of the vehicle entry.
  Applicability: Parking lots and structures

- *Bicycle Parking*. Providing for bicycle parking in prominent, convenient, and secure locations, might encourage people to bike between places as opposed to driving their personal automobiles.
  Applicability: On-street parking and parking lots and structures

- *Signage*. Parking guidance systems can help alleviate congestion and enhance pedestrian safety. A parking guidance system that shows drivers where they can find available parking spaces in a given area or parking structure can help drivers pay more attention to pedestrian and bicyclists instead of focusing on looking for an available parking space. Parking guidance systems also help people avoid the stress and frustration involved with driving around looking for parking.
  Applicability: Parking lots and structures

Absent adequate bicycle parking facilities, bicyclists may park their bicycles in improper locations.

- *Lighting*. The way parking lot lighting is designed can make the difference between an attractive and safe place or a neighborhood eyesore. Parking lots should utilize low-angle, cut-off fixtures to better direct light to those areas where it is needed. Parking lot lighting often involves balancing the need to provide adequate lighting to ensure personal safety with the concerns of neighboring property owners about glare and spillover lighting. Low-angle, cut-off fixtures minimize glare, spillover effects, and light pollution, at the same time as ensuring there is adequate lighting. Adequate lighting creates a safe environment for pedestrians and vehicles, particularly at night, and can add an aesthetic quality to a project.
  Applicability: On-street parking and parking lots

Challenges to Smart Parking Design

As a major urban land use, the design and layout of parking facilities should be of primary importance to local planners. However, local jurisdictions have actually inhibited innovative parking design through a bewildering mix of shortsighted and outdated regulations that govern the development process. These regulations, codified in various documents, including zoning ordinances, parking and street standards, and stormwater management guidelines, are difficult to decipher and sometimes contradictory. As a result, regulations can discourage developers from incorporating innovative parking design in development projects, as they are concerned about the time and money it might cost to navigate through the approval process. Developers recognize that the construction, operation, and maintenance of parking facilities are costly components of development projects, and that innovative design solutions can translate into reduced development and maintenance costs and allow projects to operate at a greater floor area ratio, thereby increasing the profitability of the project. Local planners need to take a closer look at the regulations that govern parking design to enable and encourage innovation. Developers can pressure local governments to do so and continue to seek innovative design solutions that may cost more money upfront but could translate into higher densities and more successful projects.

Possible Strategies

This section has provided recommendations to developers and local governments on the integration of parking facilities into the urban fabric to minimize environmental and aesthetic impacts. Although these recommendations have been structured under the specific objectives they aim to achieve, many of these recommended design strategies actually support multiple objectives. The chart on Page 28 summarizes the recommended strategies and illustrates the respective objectives and types of parking facilities to which each recommendation applies.

The following is a list of recommendations for local governments to consider that support the recommended innovative parking design strategies discussed in this section:

- Adopt minimum setbacks from street to parking lot to encourage placement behind buildings
- Reduce minimum parking requirements for structures and lots placed behind buildings
- Revise parking design guidelines to require screening for parking lots and architectural treatments for parking structures
- Revise design guidelines to require landscaping (ratio of trees to parking spaces or certain % canopy cover at maturity)
- Revise street standards to require on-street parking where applicable
- Reduce minimum parking requirements if on-street parking accessible
- Reduce minimum parking requirements for structures
- Revise stall dimensions
- Require a certain percent of spaces designated for compact cars

- Allow tandem/stacked parking and valet parking to meet minimum parking requirements
- Revise stormwater management guidelines to enable and encourage innovative stormwater management systems
- Reduce minimum parking requirements for implementation of innovative stormwater management systems (alternative pavers, swales, bioretention areas, open sections, green roofs)
- Reduce minimum parking requirements for incorporation of retail and commercial uses in parking structures
- Require bicycle parking
- Reduce minimum parking requirements for bicycle facilities
- Revise design guidelines to require pedestrian pathway landscaped or delineated by non-asphaltic material
- Revise design guidelines to require low-angle, cut-off lighting fixtures

	OBJECTIVES					TYPE OF PARKING FACILITY		
	Design sites such that vehicles are not the dominant feature	**Provide parking without large expanses of pavement**	**Minimize runoff from parking facilities**	**Encourage vibrant street level activity**	**Create a safe and comfortable environment**	**On-Street Parking**	**Parking Lot**	**Parking Structure**
Locate facility behind building	X			X	X		X	X
Integrate facility into site topography	X	X	X				X	X
Screen facility through landscaping or architectural treatments	X			X			X	X
Landscape interior parking areas	X	X	X				X	
Provide on-street parking		X		X	X	X		
Construct parking structures	X	X						X
Build automated parking structures	X	X						X
Reduce stall dimensions		X	X			X	X	X
Provide compact car spaces		X	X			X	X	X
Incorporate tandem/stacked or valet parking		X	X				X	X
Use alternative pavers		X	X				X	
Break up large parking lots	X	X	X				X	
Utilize open sections		X	X				X	
Incorporate vegetative swales and bioretention areas on-site		X	X				X	
Construct a green roof			X					X
Incorporate retail and commercial uses	X			X				X
Limit curb cuts				X	X		X	X
Provide clearly defined pedestrian corridors					X		X	X
Enhance bicycle and pedestrian entrances	X				X		X	X
Provide bicycle parking facilities					X	X	X	X
Implement a parking guidance system					X		X	X
Utilize low-angle, cut-off lighting					X	X	X	

PARKING FINANCING

The cost of constructing, operating, and maintaining parking facilities has an enormous impact on development patterns and on the feasibility of smart growth projects. The type of parking facility constructed in a development project is usually determined by balancing the cost of land versus the cost of constructing parking. Parking structures can cost more than five times as much per space as parking lots. Therefore, in suburban and rural areas, the relatively low cost of land makes surface parking more cost-effective than building a garage. On the other hand, in urban areas, parking garages are more economical since land costs are at a premium. More specifically, according to the Victoria (Canada) Transport Policy Institute, structured parking typically becomes cost effective when land prices exceed about $1 million per acre. Even though parking garages are more economical in urban locations than in suburban locations, projects aimed at infill and redevelopment of urban areas might still be cost-prohibitive given minimum parking requirements and the high cost of constructing parking structures.

Absent creative financing mechanisms, suburban locations will continue to enjoy a significant competitive advantage over urban locations and vast expanses of parking will continue to dominate the American landscape. Surface parking is clearly not the most efficient and best use of land, having detrimental impacts on both neighborhood character and the environment. Structured parking can significantly reduce impervious cover by reducing acreage converted to parking and has less of a visual impact than surface parking. However, it is unlikely that structured parking will become the norm, outside of urban environments where land costs are high, absent significant incentives to defray the cost of constructing structured parking. This section discusses both traditional and creative financing mechanisms and incentives for the construction of both privately- and publicly-owned and operated parking structures.

Privately-Owned Parking Structures

The development of privately-owned and operated parking structures is typically financed through conventional construction financing through private banking institutions. There are various ways in which developers recoup these expenses including bundling the costs of parking into the rents and purchase prices of the uses the parking is serving, assessing parking fees on users, and leasing or selling space incorporated in the parking structure itself.

- *Bundled Parking*. Developers typically bundle the costs of parking into the rent or purchase price for residential and commercial units and buildings. Through this practice, visitors to the development project can typically park for free, while the tenants and owners bear the costs of parking through increased rents or purchase prices. Tenants and owners can in turn pass the costs on through higher priced goods for retail uses or lower employee salaries for office uses. While bundled parking has been a common practice and serves as a way to help cover costs related to the construction of parking facilities, bundling parking costs with rents and purchase prices is not a recommended strategy since it encourages automobile ownership and is a disincentive for using alternative transportation modes, as discussed in the section on parking management.

- *Parking Fees*. Another way in which developers can cover the costs of constructing, operating, and maintaining parking structures is by levying parking fees directly on the users of the parking facility. Parking rates can be set to defray the cost of constructing and operating a parking facility, or could be set to cover only the operating costs. The parking rates should be carefully structured to achieve a balance between the costs to be covered and the impact the fee may have on the demand for the facility.

- *Leases and/or Sell Space*. Structured parking facilities provide numerous opportunities to capture ancillary sources of revenue. Developers can incorporate retail or office space into lower levels of parking facilities and lease or sell this space to help pay for the costs of constructing, maintaining, and operating the parking facility. Developers could also sell development rights, including air rights over the parking facility, if the parking facility does not take full advantage of the permissible development rights.

In addition to these parking-related revenues, private sector developers can sometimes receive incentives from the public sector to help cover the costs of constructing structured parking facilities. These incentives include reduced development fees, land acquisition and assemblage assistance, reduced parking

requirements, density bonuses, and real estate tax abatements. Reduced minimum parking requirements, density bonuses, and real estate tax abatements are discussed in greater detail below:

- *Reduced Minimum Parking Requirements*. Local jurisdictions can help incentivize structured parking facilities by reducing minimum parking requirements for development projects that incorporate structured parking as opposed to surface parking. Reduced parking requirements allow development projects to operate at a higher floor area ratio, thereby increasing the profitability of the development project.

- *Density Bonuses*. Density bonuses are a tool used by local jurisdictions to allow a development project to have a floor area bonus to help offset the costs of constructing structured parking. For example, both the City of Suffolk, Virginia, and the City of San Antonio, Texas, offer density bonuses as incentives for converting surface parking to structured parking—in both cities, for each 100 spaces of surface parking converted to structured parking on an area not exceeding 20% of the site area, an additional 20,000 feet of non-residential space may be constructed. The City of Sioux Falls, Iowa, allows for density bonuses that vary according to the percent of required parking that is within a structured parking facility. For example, if 100% of the required parking is within a parking structure, the project receives a 10% density bonus; if 50% of the spaces are within a structure, the project receives a 5% density bonus. As with reduced minimum parking requirements, density bonuses allow the project to operate at a greater floor area ratio, thus increasing the profitability of the project.

- *Payment in Lieu of Taxes Agreements*. A payment in lieu of taxes (PILOT) agreement is essentially a real estate tax abatement that allows a developer of a specific type of real estate project, as typically defined in state and local statutes, to substitute for an established period of time the annual real estate taxes due on a property with a negotiated payment. With respect to parking facilities, PILOTs typically enable the development of parking facilities that otherwise might not be built since the private returns on parking facilities might be inadequate to assume the risk associated with constructing such facilities. Although PILOT agreements have been successful in getting parking facilities constructed, these agreements are not without their drawbacks. PILOTs can become very costly subsidies since the public sector may end up foregoing millions of dollars in property taxes during the term of a PILOT agreement.

Payment in Lieu of Taxes in Baltimore City

Expanding Baltimore City's payment in lieu of taxes (PILOT) program to include off-street parking facilities is one approach the City is using to help alleviate the downtown parking shortage, which was commonly viewed as one of the contributing factors in companies' decisions to relocate to the suburbs where there is plentiful and free parking.

In 1999, the State of Maryland expanded the PILOT authority in Baltimore City to enable the City to offer PILOTs for economic development projects that achieve a clear and well-documented public purpose, including the construction of downtown parking facilities (Tax Property Article, Section 7, Subtitle 5). To qualify as an economic development project, the parking facility must be located in a downtown urban renewal area, as defined by city ordinances, and contain at least 250 parking spaces. In addition, the developer or owner of the facility must invest at least $2.5 million in private capital and must pay property taxes on the original value of the land and a minimum of 5% of the incremental property taxes that would otherwise be due absent the PILOT agreement.

Developers or owners of proposed parking facilities that meet the above criteria may negotiate a PILOT agreement with the Baltimore Development Corporation (BDC), the quasi-public agency charged with overseeing the economic development of the city. In negotiating the agreement, BDC conducts an economic analysis of the project that includes identification of funding sources, projected returns to the developer, and the projected benefits of the project. including number of jobs created and other tax revenues generated by the project. The PILOT agreement must be approved by the City Council and the Board of Estimates. Construction must commence within eighteen months of the PILOT, otherwise the agreement will no longer be valid. The term of the PILOT agreement must not exceed 25 years, and full property taxes must be paid each year after the expiration of the agreement.

Although private developers typically rely on conventional financing, they are increasingly looking to local jurisdictions and state governments to help gain access to long-term capital markets through bond financing, rather than relying on construction financing through private banking institutions. Through state and local governments, private developers can gain access to private activity bonds for the financing of parking structures.

- *Private Activity Bonds*. Private activity bonds are bonds issued by a government entity to provide financing for projects used by a private or non-governmental entity. Private activity bonds are generally backed by project-related revenues. With respect to bonds issued for the construction of parking facilities, the interest on the bonds is usually taxable since privately-owned parking facilities typically do not meet the requirements for tax-exempt status established by the Internal Revenue Code—that is, they do not keep private use and private payment below the specified 10% threshold. In some cases, such private activity bonds may be tax-exempt, namely when government entities issue the bonds to provide financial assistance for projects that advance specific public policies such as urban redevelopment. For example, many local jurisdictions provide Enterprise Zone Facility Bonds to businesses located in designated enterprise communities or empowerment zones, low-income areas in which special tax credit programs and incentives are targeted to stimulate economic development. Enterprise Zone Facility Bonds provide tax-exempt financing to enterprise zone businesses to finance, refinance, and reimburse costs of a wide variety of capital projects. Eligible Enterprise Zone Facility Bond projects include the construction of parking facilities for customers and employees. The State of Maryland offers several different tax exempt and taxable private activity bond financing programs. With respect to parking facilities, the Maryland Transportation Authority provides bond financing for the development of parking structures in priority funding areas.

Maryland Transportation Authority Smart Growth Parking Program

In 2001, the Maryland General Assembly enacted legislation that authorizes the Maryland Transportation Authority to finance, construct, operate, maintain, and repair vehicle parking facilities in Priority Funding Areas. This legislation enables the Authority to issue revenue bonds to finance parking facilities. The bonds may be backed by a variety of sources including private and government grants and parking revenues. These revenues must be used to pay all operating and maintenance costs and debt service until the Authority bonds are retired. Authority participation is limited to the amount that can be covered by the revenue stream. Minimum debt coverage ratio to be attained is 1.25 times the debt service after operating costs. The Authority bonds are "stand-alone issues" whose cost is dependent on the financial feasibility of the project. The Authority cannot make a financial investment into the project. Project costs over the amount the Authority can finance through bonds must be covered by project partners. The Authority will retain an ownership interest in the facility for the term of the bonds, which may not exceed 30 years. The Authority's ownership interest will revert to the project partners with the retirement of the Authority bonds. This legislation requires the Authority to give priority to projects located within a transit-oriented development area.

Publicly-Owned Parking Structures

Publicly-owned parking structures are typically financed through the issuance of municipal bonds that are in turn repaid through a variety of sources including parking related revenues and tax revenues. The interest earned on these bonds is usually exempt from federal taxes, and may be exempt from state and local taxes as well. As a result of this tax exemption, municipal bonds carry relatively low interest rates. Therefore, the issuing entity benefits by paying lower interest rates and the investors benefit from tax-free interest income. With respect to the bonds issued for the financing of publicly-owned parking facilities, under the Tax Reform Act of 1986, 90% of the available parking spaces must be made available to the general public to be exempt from federal taxes. Bonds used to finance publicly-owned parking facilities that provide less than 90% of the spaces to the general public are subject to federal taxation.

Municipal bonds issued for the construction of parking facilities can be backed by either parking related revenues, including user fees and fines, lease or sale of development rights, parking taxes and development impact and in-lieu fees, or tax revenues, including ad valorem property taxes, special assessments, and tax increment financing. The public sector can rely on a variety of bonds, depending on which of these

repayment sources are used to back the bond—including general obligation bonds, special assessment bonds, revenue bonds, double-barreled obligations, and tax increment finance bonds. This section discusses the various types of municipal bond financing and the repayment methods.

- *Revenue Bonds*. Revenue bonds are one of the most commonly used forms of financing for parking facilities. Revenue bonds are bonds issued to finance revenue-generating uses, such as toll roads, bridges, airports, water and sewage treatment facilities, and hospitals. The principal and interest of revenue bonds are paid exclusively by project revenues such as tolls, charges, or rents paid by users of the facility. Therefore, revenue bonds are generally not backed by the credit or taxing power of the issuing entity. With respect to revenue bonds issued for parking facilities, the principal and interest is typically repaid from parking fees and other parking related revenues such as parking taxes and leases, among others. Revenue bonds, particularly for parking facilities, are not risk-free—that is, a parking facility financed with a revenue bond might not generate the projected revenue. In light of revenue shortfalls, revenue bonds typically have a reserve fund from which to draw. The following is a description of some of the repayment sources for revenue bonds issued for the construction of parking facilities.

    - *Parking Fees and Fines*. As in privately-owned and operated parking facilities, parking fees are common means of generating revenue for public parking development and maintenance. Parking rates can be set to defray the cost of constructing and operating a parking facility, or could be set to cover only the operating costs. The parking rates should be carefully structured to achieve a balance between the costs to be covered and the impact the fee may have on the demand for the facility. Moreover, the public sector can generate revenue through enforcement and the issuance of parking citations—these fees are generally used for parking-related maintenance and improvements.

    - *Leases and/or Sell Space*. As in privately-owned and operated parking facilities, the public sector can help cover the costs of constructing public parking facilities by capturing ancillary sources of revenue such as the lease or sale of retail or office space incorporated into the parking structure or the sale of development rights, including air rights over the parking facility.

    - *Parking Taxes*. The public sector can generate revenue by levying parking taxes on privately-operated parking structures to help fund the construction of public parking facilities. Parking taxes are taxes levied on operators of off-street parking facilities. For example, as was cited earlier, in the City of Baltimore, the Parking Authority collects a parking tax equal to 11% of a parking facility's gross transactions and a flat rate of $14 per month per monthly user.

    - *Development Impact and In-Lieu Fees*. The public sector can help finance centrally located, public parking facilities that offer shared parking opportunities through development impact fees or parking in-lieu fees. Development impact fees are fees paid by a developer as a condition of issuance of a building or zoning permit by a unit of government to fund public facilities, including parking structures, necessary to serve the new development. In-lieu fees are fees paid by a developer in exchange for reductions in minimum parking requirements. Parking impact fees, a specific type of development impact fee, are typically based on a flat fee per square foot of floor area and vary by land use. Therefore, parking impact fees are assessed regardless of how much parking is provided on site. On the other hand, parking in-lieu fees are based on the parking deficit generated for a specific development project. For example, the Town of Westport (Connecticut) Zoning Regulations allow for developers to pay fees-in-lieu of providing all or a portion of the off-street parking spaces required for projects located in a designated Historic Design District. In this example, the fee-in-lieu of parking is set at $2,000 per deficit parking space and must be paid in full by the applicant prior to the issuance of a zoning permit.

- *General Obligation Bonds*. Prior to the increasing popularity of revenue bonds, general obligation bonds were the primary way in which local jurisdictions financed public parking facilities. General obligation bonds are bonds secured by the full faith and credit of the issuing entity and backed by the issuer's taxing power. The principal and interest of general obligation bonds are typically repaid through an ad valorem property tax, a property tax levied across an entire jurisdiction to help fund

public improvements. General obligation bonds typically have the lowest possible interest rate or cost of borrowing since they have less risk than other type of bonds, particularly revenue bonds, as the debt-service is tied to the tax base rather than a revenue stream.

- *Special Assessment Bonds*. Like general obligations bonds, special assessment bonds are backed by a jurisdiction's taxing authority; however, special assessment bonds are backed by proceeds derived from a special tax levied on specific taxpayers that directly benefit from the public improvement, as opposed to an ad valorem tax levied across the jurisdiction. Special assessments are commonly used for such public works projects as street paving, drainage, water and sewer systems, and parking facilities. Special assessment bonds place a major share of the burden of financing on those individuals receiving the greatest benefit from the improvement. Depending on the cost a particular special assessment bond, the bond might be secured by the full faith and credit of the issuing entity.

Special Taxing Districts in the State of Maryland

The Annotated Code of Maryland authorizes ten counties—Anne Arundel, Calvert, Charles, Frederick, Garrett, Howard, Montgomery, Prince George's, Washington, and Wicomico—and all municipalities to create special taxing districts, issue tax-exempt bonds to finance infrastructure improvements in these designated districts, and levy ad valorem or special taxes to repay the issued bonds. The purpose of this authority is to provide financing, refinancing, or reimbursement for the cost of infrastructure improvements, including parking facilities. In order to implement this authority, a petition must be filed with the local jurisdiction by at least two-thirds of the property owners located within the district by number and by assessed valuation. Upon receipt of this petition and before issuing bonds, the governing body of the jurisdiction must designate by resolution an area or areas as a special taxing district, create by resolution a special fund into which the special taxes are to be deposited, and provide for the levy of an ad valorem or special tax on all real and personal property within the designated district at a rate designed to provide adequate tax revenues to pay the principal, interest, and redemption premium on the bonds and to replenish any reserve funds.

One example of the use of special taxing districts in Maryland is Montgomery County. In 1994, Montgomery County enacted the Development District Act, Chapter 14 of the Montgomery County Code, which authorized the County to provide financing, refinancing, or reimbursement for the cost of infrastructure improvements necessary for the development of land in areas of the County of high priority for new development or redevelopment by creating development districts in which special assessments, special taxes, or both may be levied. The Act also authorized the issuance of tax-exempt bonds or other obligations of the County payable from special assessments or special taxes collected, or tax increments created, in a development district, and specified the procedures to be followed in creating a development district, issuing bonds, and assessing and enforcing the collection of special assessments or special taxes in such a district. In accordance with Chapter 14 of the County Code, the County Council created two development districts in 1998—the Kingsview Village Center Development District and the West Germantown Development District. With respect to the West Germantown Development District, the District was created in an unincorporated area of Montgomery County, encompassing approximately 672 acres. Various transportation, public park, and sewer infrastructure improvements are intended to be constructed by developers and acquired by the County at completion. On April 11, 2002, Montgomery County issued approximately $16 million in special revenue bonds to fund the improvements. On May 23, 2002, the County Council approved a special tax of $0.224 per $100 of assessed value on all real property located in the District and a special benefit assessment on undeveloped residential property located in the District of $744.96 per equivalent dwelling unit. These rates were set at rates sufficient to pay the principal of, interest on, and any redemption premium on any special obligation bonds issued with respect to the District, and to replenish any related debt service reserve fund.

- *Double-Barreled Bonds*. Government entities sometimes issue a hybrid of general obligation bonds, special assessment bonds, and revenue bonds to finance capital projects—such bonds are called double-barreled bonds, as they are backed by two or more repayment sources. Double-barreled bonds used to finance parking facilities are backed by both parking related revenues and tax revenues. Typically, the parking related revenues are the first repayment source; should these not be sufficient, tax revenues can be utilized. Double-barreled bonds are typically used when the projected revenue stream is uncertain.

- *Tax Increment Finance Bonds*. Tax increment finance bonds are bonds backed by recapturing, for a time, all or a portion of the increase in property tax revenues generated by new development (both public and private) in a specified area. That is, the rationale behind tax increment financing is that an initial public investment in a defined area will increase property values in that area, which in turn will generate additional tax revenue that can then be used to pay off the loans issued to pay for the initial public investment. Tax increment financing is used by cities and redevelopment authorities to finance certain public redevelopment costs including acquiring properties, rehabilitating publicly-owned structures, demolishing buildings, relocating occupants, cleaning up contamination, constructing public improvements, and administrative costs. The construction of public parking facilities is typically an authorized use for tax increment financing since the construction of parking facilities is commonly viewed as an economic development generator that will spark commercial development and increase area property values. Tax increment financing enables municipalities to revitalize blighted communities without raising local property taxes or depleting general revenues.

With budgetary constraints and limited bonding authority, local jurisdictions are turning to alternative financing arrangements for projects traditionally funded through municipal bonds. Two such methods that are becoming increasingly popular are public-private partnerships and lease purchase financing.

Tax Increment Financing in the State of Maryland

The Tax Increment Financing Act of 1980 authorizes all counties and municipalities in the State of Maryland, except for Baltimore City, to establish tax increment finance districts and pledge property taxes on the increased assessed values in those districts toward payment of bonds used to finance development in the districts. According to the Act, tax increment financing can be used to finance certain public redevelopment costs including acquiring properties, rehabilitating publicly-owned structure, demolishing buildings, relocating occupants, and constructing public improvements including parking facilities. In 1994, State legislation provided Baltimore City with similar authority to utilize tax increment financing, but did not allow the City to use tax increment financing for parking facilities. In 2001, this legislation was amended to authorize the City to use tax increment financing for parking facilities that are either publicly or privately owned but serve a public purpose. The State legislation is enabling only, and counties and municipalities must implement the provisions of the Tax Increment Financing Act by local ordinance or resolution.

- *Public-Private Partnerships*. Government entities are increasingly looking to the private sector to assist in developing capital projects, including parking facilities. Public-private partnerships can leverage scarce funding resources by allowing private firms to own or operate a facility or service developed with public funds. More specifically, through public-private partnerships, a public entity and a private organization come together to plan, finance, and construct capital projects, in so doing, sharing responsibility for raising capital and project risks, and also sharing project rewards. By sharing these responsibilities, the public entity is able to reduce the direct costs of the project to the government, leverage private investment, and increase project viability. In public-private partnerships, public sector involvement is vital since it typically guarantees the tax-exempt status of bonds used to finance the project, thereby making what might otherwise be an infeasible project viable. An example of such a public-private partnership is the Hollywood and Highland project in Hollywood, California. This project is part of a redevelopment plan for a larger area and consists of a mixed-use redevelopment combining retail and entertainment uses, public spaces, and a hotel. The feasibility of this $300 million project hinged on the need for $80 million in public funds to finance a multi-story subterranean parking garage with 3,000 spaces to service the project and the surrounding area. In response, the City issued tax-exempt parking revenue bonds to generate the

$80 million. The tax-exempt public financing of the structure made what would have been an otherwise infeasible parking structure, which would have stalled the overall redevelopment project, feasible. The bonds are to be repaid by parking revenues collected from parking lots and meters citywide.

Public-Private Partnerships: Joint Development

Joint development is a specific type of public-private partnership in which government entities market publicly-owned, transit-oriented properties to private sector developers with the objective of developing commercial, residential, or mixed-use development projects that ultimately have a direct impact on increasing transit ridership. Joint development allows public entities to sell excess land around transit stations and use the proceeds to defray the capital costs of transit projects. This excess land, in many cases, is underutilized surface parking lots that serve the transit station. Therefore, one of the key features of joint development projects is a parking structure that replaces the parking that was previously accommodated in the surface lots. Finding innovative ways to finance these parking structures is critical in making joint development projects feasible. One such funding source is federal grants such as Congestion Mitigation and Air Quality (CMAQ) funds. That is, through joint development, the involvement of the public entity enables the use of CMAQ funds, which would not be otherwise available to private developers. CMAQ funds are funds provided by the federal government to State DOTs and local governments to invest in projects that reduce transportation related emissions in nonattainment and maintenance areas for ozone, carbon monoxide, and small particulate matter. Joint development is typically an eligible activity for CMAQ funds since it aims to create transit-oriented, high-density, mixed-use development that results in increased transit ridership. Moreover, the 1998 reauthorization of the CMAQ program provides greater flexibility for public-private partnerships, specifically joint development projects, by allowing States to allocate CMAQ funds to private and non-governmental agencies. Federal transit capital funds are also eligible for use in TOD projects when the project is physically proximate to the transit facility and the project will contribute to transit ridership.

The Washington D.C. Metropolitan Area Transit Authority (WMATA) operates the second largest commuter rail system in North America. The Metrorail system extends 103 miles and includes 83 stations on five separate lines. The $10 billion system carries over a half a million people each weekday and is clearly a tremendous asset to the Washington Metropolitan region. WMATA has a very active joint development program to seek public and private sector partners to develop WMATA-owned real property at and around transit stations. The four main goals of the joint development program are: 1) to promote transit-oriented development; 2) to attract new riders to the transit system; 3) to create a source of revenue for the Authority to operate and maintain the transit system; and 4) to assist local jurisdictions to recapture a portion of their past contributions. WMATA's participation in joint development projects typically includes either the sale or lease of excess WMATA-owned or controlled real property interests, including air rights, or the provision of direct physical connections, including pedestrian, vehicular, and visual connections, to WMATA facilities from adjoining private development. To date, WMATA has completed over 20 joint development projects.

- *Lease Purchase Financing.* A relatively new method of financing municipal parking structures is lease purchase financing. In a typical lease purchase agreement, a non-governmental party will construct or purchase a facility, as opposed to the local jurisdiction, and the local jurisdiction will make lease payments to the party. Lease purchase financing is typically structured as a series of one-year renewable obligations spread out over the life of an asset. Jurisdictions are turning to lease purchase financing as an alternative to the issuance of bonds, as it enables jurisdictions to finance capital projects, including public parking facilities, without incurring long-term debt obligations. The most commonly used form of lease purchase financing is Certificates of Participation (COP). Under COP arrangements, the private entity raises funds for the construction or purchase of the facility through the sale of COPs to multiple investors, who buy shares of the anticipated lease revenues rather than purchasing a bond secured by those revenues. The jurisdiction pays yearly lease

payments consisting of principal and interest to the certificate holders until the debt is repaid. The private entity also receives a portion of each lease payment as tax-exempt interest. A trustee, such as a bank or trust, typically prepares and executes the certificates, holds title to the leased asset, and receives the jurisdiction's payments and remits them to the certificate holders. Once repayment is complete, the ownership of the asset is transferred to the jurisdiction. If the jurisdiction should default on the lease payments, the trustee is responsible for selling the assets and using the proceeds to reimburse the certificate holders. Although COPs can bear a higher interest rate than general obligation bonds and revenue bonds, lease purchase financing and COPs have become increasingly popular as they allow for financing without incurring long-term debt or depleting general revenues and do not require a public referendum.

Challenges to Parking Financing

As stated in the beginning part of this section, parking structures are costly to construct—in fact, in some cases smart growth projects are infeasible given the exorbitant costs of providing structured parking. Developers have typically financed parking structures through traditional construction financing and passed the costs of constructing parking onto tenants and buyers. However, to offset the high costs of constructing parking structures, developers are increasingly relying on the public sector to gain access to bond financing. At the same time, the public sector is also relying on bond financing to finance public parking structures. Given today's budgetary constraints and limited bonding authority, there is therefore a large demand on what is increasingly becoming a scarce resource. Indeed, the public sector is finding it more and more difficult to finance parking structures through traditional general obligation bonds and, therefore, is seeking new ways to help finance parking structures. This section has provided an overview of traditional bond financing, such as general obligation bonds, and some of the more innovative bond financing mechanisms including special taxing districts and tax increment finance districts. In addition, this section has detailed other sources of revenue and incentives for the construction of parking structures. Through a combination of innovative bond financing, revenue sources, and incentives, parking structures that might otherwise be infeasible can be made viable and even preferable to surface parking lots. The final part of this section summarizes some of the actions both the public sector and developers can take to help make parking structures more cost-effective and viable.

Possible Strategies

Public Sector

- Reduce parking requirements for development projects that incorporate parking structures rather than parking lots
- Offer density bonuses to development projects that incorporate parking structures rather than parking lots
- Grant developers of parking structures access to long-term capital financing through tax-exempt, where applicable, and taxable bond financing
- Levy parking taxes on privately-owned parking facilities to help finance municipal parking structures
- Establish a development impact and/or in-lieu fee system to help finance municipal parking structures
- Assess parking fees on users of municipal parking facilities and differentiate those fees to benefit high priority users such as high occupancy vehicles and compact cars
- Enforce time limits on parking meters
- Incorporate retail and commercial uses into lower levels of municipal parking structures and sell or lease this space to raise revenue for the construction, operation, and maintenance of the parking facility

- Consider designating special taxing districts or tax increment finance districts to help finance parking structures
- Seek private sector partners to help develop municipal parking structures
- Explore the possibility of using lease purchase finance arrangements to finance municipal parking structures

Developers

- Assess parking fees on users of privately-owned parking facilities and differentiate those fees to benefit high priority users such as high occupancy vehicles and compact cars
- Incorporate retail and commercial uses into lower levels of privately-owned parking structures and sell or lease this space to raise revenue for the construction, operation, and maintenance of the parking facility
- Seek access to tax-exempt and taxable bond financing through local and state governments
- Seek public sector partner to help develop parking structures

CONCLUSION

Present development patterns all but necessitate the need for personal automobiles to move between places. The need for cars naturally generates the need for parking, yet accommodating parking needs can be one of the most challenging aspects of the development process. It is critical to provide enough parking without providing too much and integrating parking facilities into existing communities is often difficult. Vast expanses of surface parking have negative impacts on water quality, walkability, and the general aesthetic quality of the built environment. Multi-level parking garages in addition to being cost-prohibitive, often leave entire city blocks with little street level interest and activity. No one wants acres of pavement or dead gaps in the urban fabric, yet from the user's perspective parking needs to be convenient, safe, and accessible, and from the developer's perspective parking needs to be cost-effective.

This best practices study has detailed innovative approaches to parking—its management, design, and financing. The possible strategies listed at the end of each section give both the public and private sectors a range of options to consider when rethinking traditional ways of approaching parking. All of the answers are not found in these pages. Instead, this study should act as a springboard for conversations that will eventually lead to "win-win" parking scenarios for governments, for developers, and for communities.

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INDEX