

The Dynamics of Off-Street Parking

At the end of World War II, only a small percentage of U.S. cities had zoning ordinance provisions for off-street parking. This percentage increased greatly during the 1950s and 1960s, and eventually to a point where the overwhelming majority of urban and suburban communities require a minimum supply of off-street parking for new developments. In general terms, public officials have sought to minimize externalities created by development—costs not borne by those who are responsible for the development. In particular, off-street parking standards are an attempt to minimize spillover parking on public streets and to ensure safe and efficient movement of traffic by requiring that the supply of parking at the site of the development is adequate to meet demand.

Although the link is not always well understood, parking and transportation are inseparable. While the American Public Transit Association (2002) has found that the number of people using public transportation during a typical weekday has increased 20 percent since 1995, motor vehicle use continues to expand. U.S. Department of Transportation (2002) figures verify that the number of registered motor vehicles in the United States has increased much faster than the rate of population growth over the past several decades. At the same time, the average vehicle is being driven

more miles annually. These figures show that Americans have developed a seemingly insatiable appetite for mobility. Of course, vehicles require a place to be stored at the end of each trip. A number of development projects dedicate as much or more land area to parking area than to building area.

It's important to recognize that there are a variety of stakeholders in decisions about off-street parking requirements (e.g., developers, business owners and their employees and patrons, community residents, and the general public, all of whom have an interest in mobility and in an attractive physical environment where automobile traffic is not overwhelming and the air is clean to breathe). The amount of parking provided for the range of land uses in a community is an important link between land use, transportation, design, and environmental quality. Not only is thought given to matching the amount of off-street parking required by municipal zoning codes to the actual parking demand, but planners and policy makers increasingly pay attention to the ways in which an excess supply of free or inexpensive parking influences demand and creates externalities. Some studies (Municipality of Metropolitan Seattle 1992; Willson 1992; Willson 1995) indicate that many communities have created parking standards that require developments to build parking spaces far in excess of demand, even given the continuing growth of automobile ownership and use. For example, a Seattle study, *1991 Parking Utilization Study*, found that the average parking supply exceeded average demand by 30 percent at 36 office and industrial sites located in noncentral business district suburban locations in the Seattle area.

Business owners and land developers must balance the expense of providing off-street parking with their desire to ensure that patrons and employees have easy vehicular access to the site. The amount of parking provided varies widely from one development to the next, even among developments sharing similar characteristics. While some choose to minimize the supply of off-street parking, others oversupply parking to the extent that many spaces are rarely used. Some business owners consider visible excess parking a necessary perk for employees and a welcome mat that makes potential patrons aware that there is no shortage of parking serving the business.

In terms of the larger picture, there has been an increasing body of literature during the past decade that examines the relationship between the built environment and transportation choices. The landmark LUTRAQ (Making the Land Use, Transportation and Air Quality Connection) demonstration project (1000 Friends of Oregon 1997) is one example. The project analyzed the differences between conventional suburban development and transit-oriented development scenarios in the western portion of the Portland, Oregon, metropolitan area. The study found that the LUTRAQ scenario, based on transit-oriented development, could result in a variety of transportation demand benefits, including a 4 percent reduction in auto ownership rates and fewer vehicle trips per household each day.

Much recent parking literature argues that excessive parking supply discourages alternative modes of transportation, reduces density, increases the cost of development, creates an uninviting built environment, and degrades the natural environment (e.g., by increasing polluted stormwater runoff into area water bodies, increasing air pollution by inducing automobile travel, and contributing to urban heat islands). While benefits may accrue from minimizing the amount of off-street parking, downsizing minimum parking requirements may be a tricky proposition in many communities due to the feared impact on other community objectives.

THE BASIS FOR ZONING CODE PARKING REQUIREMENTS

Purpose statements found in municipal zoning codes can provide some guidance regarding the rationale behind off-street parking requirements. However, most simply have statements such as, “The provisions of this chapter have been established to ensure that adequate off-street parking is provided to meet the parking needs of uses located within the city.” Some codes, such as Pittsburgh’s, make a point of mentioning flexibility in the purpose statement of its off-street parking chapter, as follows:

Purpose.

The purpose of these regulations is to:

- allow flexibility in addressing vehicle parking, loading, and access issues;
- present a menu of strategies to solve parking issues rather than parking space requirements;
- maintain and enhance a safe and efficient transportation system that is consistent with environmental goals and clean air; and
- ensure that off-street parking, loading, and access demands associated with new development will be met without adversely affecting other nearby land uses and surrounding neighborhoods. (Article 6, Section 9.14.01, amended August 24, 2000)

Determining the appropriate amount of off-street parking that should be required by a municipal zoning ordinance, like many aspects of planning, is part art and part science—and is done within a political context. When municipal officials write or rewrite their off-street parking provisions, the list of sources consulted is often short and has remained largely the same for years. Many rely on the Institute of Transportation Engineers (ITE) for information related to parking demand generated by various land uses. Some zoning codes state that, when an individual land use is not covered in the city’s off-street parking chapter, ITE standards apply. Despite the fact that ITE’s information may be the most extensive quantitative data readily available for purchase, ITE cautions that much of the information is based on studies conducted in locations where few transportation alternatives exist and/or are based on studies with a very small sample size (ITE 1987). [Editor’s note: The Parking Council of ITE had a new version of the trip generation manual in press at the time this PAS Report was in final production. Readers should consult the new manual, which, we are told, is quite different in its approach.]

Donald Shoup, chair of the Urban Planning Department at UCLA, has noted that parking demand studies are generally conducted in an environment where off-street parking is provided without a direct fee (i.e., areas outside of downtown, where fees are almost always charged). Using these studies to determine minimum requirements means that such requirements are based on the demand for parking at a price of zero, which leads to a vicious circle of an oversupply of “free” (but subsidized by somebody) parking virtually everywhere in the metropolitan landscape (Shoup 1999).

The most popular method for determining off-street parking requirements may be to borrow from the ordinances of other communities. To a large degree, it’s difficult to fault this approach. APA would not be publishing this report if it thought that borrowing standards from other cities—or at least having an awareness of the range of standards that exist—was an unacceptable approach. When APA’s Planning Advisory Service (PAS) receives inquiries related to off-street parking standards, PAS provides subscribers with ordinances, studies, and guides such as this one.

Adoption of another jurisdiction’s standards, without consideration of local socioeconomic standards, comprehensive plan, political environment,

the input of the citizens for the community, and legal review according to state enabling legislation, among other issues, may result in standards that just do not fit. Further, the most popular standards are often derived from ITE information, the limitations of which are noted above.

A number of PAS Reports and other APA publications provide useful discussions of parking standards—in some as the central topic (e.g., *Off-Street Parking Requirements*, PAS Report 432, and *Flexible Parking Requirements*, PAS Report 377) while in others as an integral issue linked to other popular planning topics (e.g., *Creating Transit-Supportive Land-Use Regulations*, PAS Report 468, and *The Transportation/Land-Use Connection*, PAS Report 448). ITE (1995) has produced a model ordinance for shared parking. In addition to APA and ITE, other available sources of information include model recommendations from the National Parking Association (1992), the Urban Land Institute (1999), and the Eno Foundation (Weant and Levinson 1990).

Transportation and parking consultants are sometimes hired to assist in determining parking standards. These consultants often provide analysis of parking issues within a particular geographic subset of a community, such as the downtown or a particularly busy commercial district. Although such studies are usually independent and authoritative, it's important to realize they may include certain assumptions (about expectations related to transit use, for example) not necessarily consistent with a community's long-term vision.

Perhaps the most effective way to analyze demand is to get out in the community to look around and record information. When you obtain information about parking occupancy in existing facilities, ask questions about the inevitability (or lack thereof) of similar conditions for future development. In an APA 2001 audio conference, "Effective Community Parking Standards," one expert recommended that communities closely examine their off-street parking standards every five to 10 years.

OTHER RELEVANT FACTORS RELATED TO DRAFTING OFF-STREET PARKING REQUIREMENTS

The Comprehensive Plan

As with any zoning code provision, off-street parking requirements should be consistent with the goals of a community's comprehensive plan. A community might review its comprehensive plan provisions related to transportation, land use, environmental quality, and design when drafting off-street parking standards to ensure a good "fit" between requirements and plan objectives.

Politics

Zoning code provisions are developed within a political context. Elected officials sensitive to complaints about parking "problems" may be reluctant to revise off-street parking requirements to more closely meet average demand or to meet objectives related to, for example, transit use, air quality, and stormwater management. Advocates for change may need to educate voters about the effect of off-street parking requirements on community character. With public support will come political support.

Administration of Regulations

Off-street parking requirements can be difficult to administer. To avoid setting expectations that cannot be met, consider the amount of staff and staff time available for administration when drafting the requirements. Also consider the process for calculating flexible parking require-

ments (e.g., shared parking determinations, discussed in detail below). If the resources to implement the process are not available, review the process and simplify it to match the resources. Without effective administration and enforcement, regulations can be a political lightning rod and generate litigation.

Reuse of Buildings

Many codes recognize that requiring different levels of off-street parking for a variety of commercial uses may lead to problems when new uses attempt to move into buildings that were tailored to different commercial uses. For example, a 5,000-square-foot retail building may be constructed to the requirement of one space per 400 square feet of gross floor area, requiring 13 spaces. If a subsequent tenant would like to convert the building to an office use, a parking standard of one space per 300 square feet would result in a requirement of 17 spaces, thus not allowing for office use without securing additional parking or granting a variance. Portland, Oregon, specifically refers to this issue in its code, as follows:

Minimum Required Parking Spaces:

A. Purpose

The purpose of required parking spaces is to provide enough on-site parking to accommodate the majority of traffic generated by the range of uses which might locate at the site over time. Transit-supportive plazas and bicycle parking may be substituted for some required parking on a site to encourage transit use and bicycling by employees and visitors to the site. The required parking numbers correspond to broad use categories, not specific uses, in response to this long-term emphasis.

There may be an inherent tension or contradiction between the desire to have off-street parking requirements that closely approximate the parking demand for each individual land use and the desire to ensure that buildings may be easily adapted to house a variety of different uses.

ZONING CODE PROVISIONS THAT RESPOND TO AND/OR INFLUENCE PARKING DEMAND

What follows is an overview of a range of strategies communities have adopted that go beyond standard minimum parking requirements. Many of these strategies recognize and respond to unique factors associated with different parts of the community in question (e.g., commercial strips, downtown districts).

Mixed-Use Development and Shared Parking

The overall number of parking spaces serving multiple uses in close proximity to one another may be significantly reduced through shared parking arrangements. Sharing parking allows more efficient use of land compared to providing dedicated parking spaces for each use. Carefully crafted shared parking arrangements between two or more uses can reasonably meet peak demand, particularly in mixed-use areas or on mixed-use or multiple-use sites. The Victoria Transport Policy Institute (2002) notes that shared parking is also most appropriate where:

- a specific parking problem exists;
- land values and parking facility costs are high;
- clustered development is desired;
- traffic congestion or vehicle pollution are significant problems; and
- adding pavement is undesirable.

Shared parking arrangements recognize that various uses have different peak operating hours. A common example is shared parking between restaurant and office uses. The parking lot may be heavily used by office employees and visitors in the daytime, while the restaurant patrons may park in the lot after most weekday office users have left and on weekends. If the restaurant is open during the day, it may benefit from lunch-time use by office employees while generating little additional daytime parking demand. In addition to efficient sharing of parking spaces and reduced development costs, transportation system benefits may result from a reduction in the number of office employees driving off-site for lunch.

In determining the amount of parking required for mixed-use or multi-use developments, many zoning codes contain provisions such as the following from Minneapolis: “Where there are two or more separate principal uses on the site, the required parking and loading for the site shall be the sum of the required parking and loading for each use, except as otherwise specified in this chapter.” Additional provisions, however, allow as-of-right parking reductions based on shared parking arrangements. The following procedure is used in Minneapolis to reduce the overall number of spaces for shared parking arrangements.

541.190. Shared Parking . . .

1. Computation. The number of shared spaces for two (2) or more distinguishable land uses shall be determined by the following procedure:
 - a. Multiply the minimum parking required for each individual use, as set forth in Table 541-1, Specific Off-Street Parking Provisions, by the appropriate percentage indicated in Table 541-2, Shared Parking Calculations, for each of the six (6) designated time periods.
 - b. Add the resulting sums for each of the six (6) columns.
 - c. The minimum parking requirement shall be the highest sum among the six (6) columns resulting from the above calculations.
 - d. Select the time period with the highest total parking requirement and use that total as the shared parking requirement.
2. Other uses. If one (1) or all of the land uses proposing to make use of shared parking facilities do not conform to the general land use classifications in Table 541-2, Shared Parking Calculations, as determined by the zoning administrator, then the applicant shall submit sufficient data to indicate the principal operating hours of the uses. Based upon this information, the zoning administrator shall determine the appropriate shared parking requirement, if any, for such uses.
3. Process. An application for shared parking shall be submitted on a form approved by the zoning administrator, as specified in Chapter 525, Administration and Enforcement.

Variations of this format are found in zoning codes in a variety of communities.

Table 541-1 is shown below. In addition, I am providing an example of how a shared parking agreement between three uses would be calculated. Those three uses are:

1. a 10,000-square-foot retail building,
2. a 6,000-square-foot office building, and
3. a restaurant with 1,000 square feet of public area.

The Minneapolis Zoning Code requires:

1. 20 parking spaces for the retail building,
2. 7 spaces for the office building, and
3. 20 spaces for the restaurant.

These figures are derived from the Minneapolis code, which outside of the city’s downtown area requires one parking space per 300 square feet of gross floor area in excess of 4,000 square feet for retail and office buildings. It also requires parking equal to 30 percent of the capacity of persons in the public area of restaurants, where the capacity of persons is based on the building code allowance of one person per 15 square feet of area. In other words, the code would require that the three uses have a total of 47 parking spaces without a shared parking arrangement. I have not factored in other allowed parking reductions (e.g., providing bicycle parking or an on-site transit shelter).

The greatest sum shown in Table 2 is 41, which becomes the overall parking requirement for the three uses. Thus, the shared parking arrangement allows this particular development or combination of developments to

TABLE 1.
SHARED PARKING CALCULATIONS
(Table 541-1 from the Minneapolis, Minnesota, code)

General Land Use Classification	Weekdays			Weekends		
	1:00 a.m.– 7:00 a.m.	7:00 a.m.– 6:00 p.m.	6:00 p.m.– 1:00 a.m.	1:00 a.m.– 7:00 a.m.	7:00 a.m.– 6:00 p.m.	6:00 p.m.– 1:00 a.m.
Office	5%	100%	5%	0%	15%	0%
Retail sales and services	0%	100%	80%	0%	100%	60%
Restaurant (not 24 hr)	20%	70%	100%	30%	75%	100%
Residential	100%	60%	100%	100%	75%	95%
Theater	0%	60%	100%	0%	80%	100%
Hotel						
Guest rooms						
Restaurant lounge (in hotel)	100%	55%	100%	100%	55%	100%
Conference rooms	0%	100%	100%	0%	100%	100%
Religious institution	0%	25%	50%	0%	100%	50%

TABLE 2.
THE RESULTS OF SHARED PARKING CALCULATIONS

General Land Use Classification	Weekdays			Weekends		
	1:00 a.m.– 7:00 a.m.	7:00 a.m.– 6:00 p.m.	6:00 p.m.– 1:00 a.m.	1:00 a.m.– 7:00 a.m.	7:00 a.m.– 6:00 p.m.	6:00 p.m.– 1:00 a.m.
Office	0.35	7	0.35	0	1.05	0
Retail sales and services	0	20	16	0	20	12
Restaurant (not 24 hr)	4	14	20	6	15	20
Total	4	41	36	6	36	32

provide six fewer parking stalls than would normally be required. The code assumes that, for the combination of these particular uses, the greatest demand for parking will take place between the hours of 7:00a.m. and 6:00p.m.

Some municipalities, rather than prescribing a particular formula or table governing shared parking, give discretion to city staff to approve shared parking arrangements based on individual circumstances, parking studies, or estimated peak operating times provided by applicants. Some outline specific criteria that must be met in order to share required parking spaces. Bellevue, Washington, for example, uses these guidelines for uses outside its downtown:

Shared Use of Parking.

The following provisions apply outside the Downtown Districts:

1. General. The Director of Planning and Community Development may approve shared use of parking facilities located on separate properties if:
 - a. A convenient pedestrian connection between the properties exists; and
 - b. The properties are within 1,000 feet of each other; and
 - c. The availability of parking for all affected properties is indicated by directional signs as permitted by Chapter 22B.10 BCC (Sign Code).
2. Number of Spaces Required.
 - a. Where the uses to be served by shared parking do not overlap their hours of operation, the property owner or owners shall provide parking stalls equal to the greater of the applicable individual parking requirements.
 - b. Where the uses to be served by shared parking have overlapping hours of operation, the property owner or owners shall provide parking stalls equal to the total of the individual parking requirements. If the following criteria are met, that total is reduced by 10 percent:
 - i. The parking areas share a property line; and
 - ii. A vehicular connection between the lots exists; and
 - iii. A convenient, visible pedestrian connection between the lots exists; and
 - iv. The availability of parking for all affected properties is indicated by directional signs, as permitted by Chapter 22B.10 BCC (Sign Code).
3. Documentation Required. Prior to establishing shared use of parking, the property owner or owners shall file with the King County Division of Records and Elections and with the Bellevue City Clerk a written agreement approved by the Director of Planning and Community Development providing for the shared parking use. The agreement shall be recorded on the title records of each affected property.

(Bellevue uses somewhat more lenient standards in its downtown.)

Keeping track of shared parking arrangements can be an administrative challenge. Informal shared parking arrangements also often exist outside the official regulatory structure, particularly in large, densely populated cities. Where such arrangements are done “officially,” subsequent changes in land uses frequently will trigger the need for more parking than was provided when a shared parking arrangement was initially approved. Some cities (e.g., Los Angeles, Schaumburg, Illinois, through its transportation demand management ordinance) encourage land banking space for future parking needs when approving a shared parking arrangement in order to accommodate evolving use of the property or properties in question. Al-

though this space provides a safety valve to prevent an eventual shortage of parking, such an approach may diminish the benefits associated with the shared parking arrangement by effectively limiting the development potential of the site.

If the uses that share parking are not located on the same parcel, the zoning ordinance should contain provisions governing off-site parking (e.g., limitations on the distance between a use and its off-site parking). The distance that off-site parking may be from the use or uses served may vary depending on the type of use or destination in question, pedestrian infrastructure, and the regional climate.

Maximum Parking Standards

Some communities, in addition to requiring a minimum amount of off-street parking, limit the amount of parking that may be provided for individual uses. Although this practice has become more widespread during the past decade, maximum standards are not currently found in most zoning codes. Communities that incorporate maximum standards range in size and character. They include San Antonio, Texas; Jefferson County (Louisville), Kentucky; Gresham, Oregon; Seattle, Washington; and San Francisco, California. And some cities, like those mentioned in the following paragraphs, do not establish set standards. Rather, they create formulas for determining maximums.

Parking maximums have been particularly prevalent in the Northwest due in part to state and regional goals or mandates. If the number of communities using such codes is any indication, however, more planners and policy makers nationwide believe that maximum standards are as important as minimum standards—if not more so. Shoup (1999b), although not espousing maximum parking standards, suspects that planners will some day look back and see minimum parking requirements as a terrible mistake. He believes minimum requirements are “observe, ambiguous, and cumbersome,” and impede progress toward important social, economic, and environmental goals. Parking maximums have been used most extensively in downtown areas, but they also can be an effective tool for communities interested in managing stormwater, increasing densities, and meeting transportation demand management objectives throughout the community.

Combined with parking minimums, maximum standards create a parking range. Maximum standards generally come in three forms. Some communities, as with typical minimum requirements, set a ratio per number of square feet of building area. Pittsburgh, for example, sets a maximum off-street parking ratio of one space per 175 square feet of retail sales and services, while the city’s minimum requirement for such uses is one space per 500 square feet beyond the first 2,400 square feet. (No parking is required for the first 2,400 square feet.) Thus, for a new 5,000-square-foot retail building in Pittsburgh, five off-street parking spaces are required and no more than 29 could be provided—a fairly wide range.

In Redmond, Washington, the Neighborhood, Retail and General commercial zones are allowed a maximum of five spaces per 1,000 square feet of floor area for most uses and a minimum of four per 1,000 square feet. In a 5,000-square-foot building, 20 spaces would be required and the cap would be 25. Redmond is an example of a suburban community that has used maximum requirements effectively.

A second method for regulating the maximum number of spaces is to base the maximum on the minimum. For example, the Draft Unified Development Ordinance in Helena, Montana, requires the following:

Maximum Number of Parking Spaces Required.

The maximum number of off-street parking spaces for any building or use shall not exceed the amount determined as follows:

1. Parking lots of more than twenty and less than fifty-one spaces. Parking lots may not have more than one hundred twenty percent (120%) of the number of spaces identified in Table 15-C, not including accessible spaces, unless a minimum of twenty percent (20%) of the parking area is landscaped in accordance with the standards of this chapter.
2. Parking lots of fifty one spaces or more. No more than one hundred ten percent (110%) of the number of spaces required as identified in Table 15-C of this chapter, not including accessible spaces, are permitted.

Based on Helena's minimum parking requirement for retail uses of 4.1 spaces per 1,000 square feet of gross floor area, a 5,000-square-foot retail store would be required to provide 21 spaces and could provide no more than 25 spaces (unless 20 percent of the parking lot is landscaped)—a very narrow range. (Note that maximum standards of 125 or 150 percent of the minimum are more prevalent and provide a somewhat wider range.) Generally, communities with minimum parking requirements that are set particularly low (i.e., below typical demand) might consider higher maximum standards (e.g., 150 or 200 percent of the minimum) when using this method.

A third method is a limit on the overall number of parking spaces in a particular geographic area. Cambridge, Massachusetts, uses parking maximums as part of comprehensive set of strategies to reduce automobile dependence (Millard-Ball 2002). The Cambridge zoning ordinance, for example, states that "the total number of parking spaces serving non-residential uses in the North Point Residence District shall not exceed 2,500 spaces, allocated to each lot in the district at a rate of 1.2 spaces per 1,000 square feet of lot area." Cambridge also uses the more popular approach of setting parking maximums for many individual land uses.

Some communities offer automatic exceptions to maximum parking standards if certain objectives are met. For example, San Antonio, Texas, which incorporates maximum standards for an extensive number of uses in its zoning code, exempts structured parking and parking located on pervious pavement. The pervious pavement exemption is subject to standards that describe the underlying soil permeability, level of the water table, the slope of the lot, and maintenance of the lot (e.g., sweeping and washing).

A note of caution: maximum standards that are set particularly low may result in spillover parking that could erode support for such standards. On-street parking restrictions accompanying maximum standards are one way of dealing with this issue, though such restrictions are also controversial in many places. Resident-only parking restrictions are often both a response to and a source of friction between the wishes of area residents, who like having on-street parking available for themselves and their guests, and businesses and institutions that rely on the ability of their patrons to find places to park. Time will tell whether maximum standards completely replace minimum requirements as concern continues to rise about traffic congestion, low-density development, and the environmental consequences of automobile dependence.

Downtown Parking Standards

In recent years, a number of communities without a traditional downtown have attempted to create such a place. Parking in downtown areas is complex and subject to a variety of competing interests. For example, the needs of businesses that rely on the availability of short-term parking are sometimes af-

fectured by commuters who occupy parking spaces from 8:00 a.m. to 5:00 p.m. Constantly adding to the downtown parking supply should not be the sole solution to solving real or perceived downtown parking “problems.” Doing so, in fact, is likely to work against goals aimed at improving air quality, reducing traffic (or at least reducing the rate of increase of traffic congestion), and increasing transit use. When parking demand in a downtown area increases substantially, there are only a limited number of ways to increase the traffic carrying capacity of downtown streets as well, some of which, such as elimination of on-street parking, are not necessarily desirable.

Levinson (1982), as cited by Barr (1997), suggests that a review of downtown parking strategies should begin with consideration of the following points:

- What are the community development, environmental, and transportation goals for downtown and the surrounding areas?
- What basic policies underline formation of plans and options?
- Which range of parking options are meaningful in relation to: existing parking facilities and street systems; downtown development patterns and intensities; origins, destinations and approach routes of parkers; transit service capabilities; and environmental and energy constraints?
- How can parking serve as a catalyst for desired development?
- Should parking be provided for all who want to drive downtown, or should it be rationed in some specific manner?
- What balance should be achieved between parking located on the outskirts of downtown and parking located along express transit stops in outlying areas?
- What are the effects of parking on the location and design of public transport routes, stations, and terminals?

Although this report focuses on zoning requirements, such requirements are only one piece of the downtown parking puzzle (as the above points suggest). Signage, pricing, location, design, supply, metering of on-street parking, and long-term employee parking versus the availability of short-term parking for retail customers are also issues to be considered.

Morrall and Bolger (1996) conducted quantitative research and concluded, “The proportion of downtown commuters using public transport is inversely proportional to the ratio of parking stalls per downtown employee.” The size of a downtown, the mix and intensity of land uses, and the availability of transportation alternatives and commercial or public parking facilities combine to form a unique environment that many zoning ordinances recognize through particularly low parking requirements and, in some cases, maximum requirements.

No minimum off-street parking requirements exist for nonresidential uses in many downtown areas, particularly in large cities (e.g., Portland, Oregon; Boston; Massachusetts; Columbus, Ohio; San Diego, California). The Parking and Access section of the Portland, Oregon, Central City Plan District contains regulations intended to “implement the Central City Transportation Management Plan by managing the supply of off-street parking to improve mobility, promote the use of alternative modes, support existing and new economic development, maintain air quality, and enhance the urban form of the Central City.” It includes no *minimum* parking standards for nonresidential uses in the core area of the downtown. *Maximum* parking requirements for office uses range from 0.7 to 2.0 spaces per 1,000 square feet of new net building area in the core.

Among medium-size downtowns, parking requirements vary widely. In the Central Business District Zone in Grand Rapids, Michigan, (pop. 197,000) parking is required at a rate of one space for each 1,000 square feet of gross floor area for nonresidential buildings and hotels. Off-street parking is not required for any building constructed prior to January 1, 1998, however, or for new buildings and cumulative additions to existing buildings with a gross floor area of 10,000 square feet or less.

CBD Parking

Required Automobile Parking

Off-street parking space as required herein shall be provided for all buildings and structures and for additions to existing buildings or structures. The number of spaces required for all uses shall be one space for each 1,000 square feet of gross floor area for all non-residential buildings and hotels, and one space per dwelling unit for all dwellings.

Required Bicycle Parking

Bicycle parking shall be provided in conjunction with new automobile parking facilities. Any new facility providing parking for more than fifty (50) automobiles, shall provide bicycle parking at a rate of one bicycle parking space for each forty (40) automobile spaces, with a minimum of six (6) spaces. In lieu of providing bicycle parking within the parking facility, the owner may provide bicycle parking at an alternate location well suited to meet the needs of potential users. Public parking facilities designed to provide remote employee parking on the fringe of the district shall be exempt from this requirement.

Madison, Wisconsin (pop. 208,000), and Richmond, Virginia (pop. 198,000), do not have parking requirements in most or all of their downtown districts; they do, however, negotiate all parking needs through a transportation management ordinance.

Communities with small downtowns vary widely in their management of downtown parking. Some have chosen to develop parking programs focused on public parking lots that serve the downtown area. In Holland, Michigan, for example, a community with 27,000 residents and a traditional downtown of approximately eight square blocks, “All businesses located in the C-3 Central Business District shall be deemed participants in a community parking program and shall be exempt from parking requirements herein specified. For any additional residential use created, additional parking areas shall be provided in accordance with the requirements set forth herein” (Section 39-52).

Distinctions Based on the Type of Commercial District

In addition to special regulations for downtown parking, some communities choose to provide distinct parking requirements based on the type of commercial district rather than delineating citywide requirements for each particular land use. (In some cases communities use overlay districts—see below.) The basic premise is that a commercial district serving a particular neighborhood will draw patrons from a relatively small market area, increasing the chances that many will arrive via walking, for example, while districts that allow uses drawing from a regional market may require more parking per square foot of floor area for the same use.

Cambridge, Massachusetts, offers an example of differentiating between districts; its regulations provide that the parking requirements vary “according to the type, location and intensity of development in the different zoning districts, and to proximity of public transit facilities.” For example, the minimum parking requirement for general retail establishments varies from one space per 500 square feet, one space per 700 square feet, and one

space per 900 square feet, depending on the type of zoning district. Maximum standards in Cambridge vary by district as well.

Portland, Oregon, does not require off-street parking in several of its commercial zoning districts (e.g., Mixed Commercial/Residential zone, Storefront Commercial zone, and the Office Commercial 1 zone). Where parking is required, the city makes distinctions based on the scale of development allowed in the district and, in some cases, the residential density of the surrounding area. There are no minimum parking requirements associated with uses in the Neighborhood Commercial 1 zone, which “is intended for small sites in or near dense residential neighborhoods.” Off-street parking is required for uses in the Neighborhood Commercial 2 zone, which “is intended for small commercial sites and areas in or near less dense or developing residential neighborhoods.” Off-street parking requirements are generally less in the Neighborhood Commercial 2 zone than in another level of commercial activity, the General Commercial zone, which “is intended to allow auto-accommodating commercial development in areas already predominantly built in this manner and in most newer commercial areas.”

The Role of Overlay Districts

Overlay districts can be an effective tool for incorporating unique parking requirements that recognize and foster unique characteristics associated with particular areas in a community.

Minneapolis has several overlay districts that incorporate special parking requirements. The Pedestrian Oriented Overlay Districts, scattered throughout the city, include maximum parking standards and restrictions on the location of parking facilities. The Downtown Parking Overlay District prohibits new commercial parking lots in the downtown area and limits the size of new accessory surface parking lots to no more than 20 spaces.

Greensboro, North Carolina, uses unique parking standards in its East Market Street Pedestrian Scale Overlay District. One purpose of the overlay district is to “modify the image of the corridor, moving away from the existing vehicular-oriented thoroughfare to an image which is attractive to pedestrian access and use.” The parking regulations in the overlay district include the following:

Parking Credits and Exceptions:

- i. In all areas, on-street parking spaces on the right-of-way between the two side lot lines of the site may be counted to satisfy the minimum off-street parking requirements.
- ii. Where parking is available off-site within 400 feet of the front entry to the building, and that parking is owned or controlled under a permanent and recorded parking encumbrance agreement for use by the occupants or employees on the site, said parking may be counted to satisfy the off-street parking requirements.
- iii. In those portions of the Overlay District with underlying zoning of GB, GO-H and HB and which are occupied as a retail use, all parking located behind the front setback of the building shall be double-counted so that each such parking space behind the front setback shall be counted as if it were two (2) spaces available to satisfy the off-street parking requirements for such retail use.
- iv. Where it can be demonstrated through a documented parking study that the demand for parking of the combined uses of two (2) or more buildings can be satisfied with the shared and jointly accessible off-street parking available to those buildings, then a special exception to these parking requirements may be granted by the Board of Adjustment to satisfy the minimum parking requirements.

The Richmond, Virginia, zoning code includes a very extensive description of the rationale underlying its Parking Overlay Districts:

Pursuant to the general purposes of this chapter, the intent of Parking Overlay Districts is to provide a means whereby the City Council may establish overlay districts to enable application of appropriate off-street parking requirements to business uses located within areas of the City characterized by a densely developed pedestrian shopping environment in close proximity to residential neighborhoods. The districts are intended to recognize that, due to several factors, business uses located in such areas typically generate lower demands for privately maintained off-street parking spaces than are reflected in the requirements generally applicable in the City and set forth in Section 32-710.1 of this chapter.

Parking requirements within Parking Overlay Districts are designed to reflect the factors that result in lower parking demand in such areas. These include: a function similar to that of a shopping center, resulting in a high proportion of multipurpose trips by patrons; considerable walk-in trade due to proximity to residential areas and employment centers; significant numbers of employees that walk to work due to proximity to living areas; availability of public transportation; and many older buildings which have been adapted from other uses and tend to be less efficient than newer special purpose buildings. It is also intended that each Parking Overlay District reflect the supply of public parking spaces within the district by providing for further reduction in the parking requirements in direct proportion to available public parking.

Parking Overlay Districts are intended to complement the UB Urban Business District and to be applied principally to those areas within such district which possess the factors enumerated above, but may also be applied independent of the UB District to other areas where such factors exist within other specified districts.

Bicycle Parking

A number of communities recognize how bicycle travel can reduce vehicular parking demand. Overall, less than 1 percent of all trips in the U.S. are bicycle trips. Since 48 percent of all trips in the U.S. are shorter than three miles, many believe the potential for increasing utilitarian bicycle travel is great (Pucher and Schimek 1999). The extent to which bicycle travel can substitute for automobile travel may depend on demographics, climate, and the availability of the infrastructure to accommodate bicycle use, including bicycle parking. U.S. communities that have the highest level of bicycle use tend to be midsize cities with a large student population, such as Gainesville, Florida; Madison, Wisconsin; Boulder, Colorado; and Davis, California. The presence of a major university need not be a prerequisite to making a serious effort to encourage bicycle travel as a legitimate form of daily transportation.

PAS Report 459, *Bicycle Facility Planning* (Pinsoff and Musser 1995), covered a wide range of bicycle infrastructure and regulation issues. The report included the following general guide that suggested minimum bicycle requirements for a variety of uses.

A number of communities have chosen to institute minimum bicycle parking requirements, while some also allow for a reduction in the number of required automobile spaces when bicycle parking is provided. (See Table 3.)

In Davis, California, considered by many to be the preeminent bicycling community in the U.S., "the number and location of all bicycle parking spaces shall be in accordance with the community development director

**TABLE 3.
BICYCLE PARKING SPACE REQUIREMENTS**

Type of Establishment	Minimum Number of Bicycle Parking Spaces
Primary or Secondary School	10% of the number of students, plus 3% of the number of employees
College or University Classrooms	6% of the number of students, plus 3% of the number of employees
Dorms, Fraternities, and Sororities	1 space per 3 students
Shopping Mall	5% of the number of automobile spaces
Commercial Street	1 space per 3,000 sq. ft. of commercial space
Sport and Recreational Center	12% of the number of automobile spaces
Office Building	10% of the number of automobile spaces
Government Building	10% of the number of automobile spaces
Movie Theater or Restaurant	5-10% of the number of automobile spaces
Manufacturing Plant	4% of the number of automobile spaces
Multi-Unit Housing	1 space per 2 apartments
Public Transit Station	20 spaces minimum
Other Land Uses	5-10% of the number of automobile spaces

General Notes: A minimum of 2 spaces are required for all new qualifying developments. After the first 50 spaces are provided, parking requirements shall be reduced by half.

Source: Pinsoff and Musser (1995).

**TABLE 4.
A SAMPLE OF BICYCLE
PARKING REQUIREMENTS**

City	Bicycle parking required
Cambridge, Massachusetts	One space for every 10 automobile spaces for most uses. In multifamily residential buildings, one space or locker must be provided for each unit.
Iowa City, Iowa	For every seven (7) bicycle parking spaces required for commercial uses the required number of off-street parking spaces for other vehicles may be reduced by one (1) space, up to a maximum of two (2) spaces if those spaces are used for bicycle parking.
Grand Rapids, Michigan	In the city's downtown, one bicycle parking space must be provided for every 40 automobile spaces, with a minimum of six bicycle spaces, in conjunction with any parking facility with more than 50 automobile spaces.
Santa Cruz, California	a. Commercial; Industrial, Office, Retail, Service: 2 +15% of auto parking requirement
	b. Multi-Family Residential (3 or more units): 1 space per unit
	c. Public, or Commercial Recreation: 35% of auto parking
	d. Schools: 1 space per 3 students
	e. Park and Ride Lots and Transit Centers: 35% of auto parking
	f. Lodging: 1 space per 5 units

or his/her designee” (California Air Resources Board 1998). Multifamily residential buildings are required to provide two bicycle spaces per dwelling unit. The city has an extensive network of bike routes and other bicycle infrastructure.

Table 4 offers a small sample of bicycle parking requirements from communities in different regions of the country.

Many of the ordinances include design and location standards for required bicycle parking that dictate, for example, bicycle rack styles, a minimum distance from building walls, and visibility and accessibility of the parking.

Transit Allowances

Offering off-street parking reductions based on proximity to public transportation is an increasingly popular approach. These reductions may serve to encourage transit ridership and, more generally, development in corridors or nodes that are well served by bus or rail. (Reduced parking requirements related to superior transit access are inherent in some of the other code provisions discussed in this chapter, such as reduced parking requirements in downtown areas.)

Minneapolis allows a 10 percent parking reduction for multifamily residential dwellings “if the proposed use is located within 300 feet of a transit stop with midday service headways of 30 minutes or less in each direction.” For all other uses, “the minimum parking requirement may be reduced 10 percent if the use provides an adequate sheltered transit stop within the development, as determined by the city engineer.”

Transit stops are one of the off-street parking reduction alternatives allowed in the Pittsburgh zoning code:

Transit Stops

The Zoning Board of Adjustment shall be authorized, in accordance with the Special Exception provisions of Sec. 922.07, to permit the incorporation of transit stops as a means of satisfying the otherwise applicable off-street parking standards, provided the following conditions are met:

1. The transit stop shall be designed to be a station or waiting area for transit riders, clearly identified as such, and open to the public at large;
2. The transit stop shall be designed as an integral part of the development project, with direct access to the station or waiting area from the development site;
3. The transit waiting area or platform shall be designed to accommodate passengers in a covered waiting area, with seating for a minimum of 20 persons, shall include internal lighting, and shall include other features which encourage the use of the facility, such as temperature control within the waiting area or the inclusion of food vendors;
4. The maximum reduction in the number of parking spaces shall be no more than 20 percent of the total required spaces;
5. The Zoning Board of Adjustment shall request a report and recommendation from the Planning Director on the planning aspects, and the potential impacts of the proposed reduction in parking through the provision of a transit facility;
6. The transit stop shall be maintained by the developer for the life of the development project.

Communities with Transportation Demand Management (TDM) ordinances often incorporate transit access in the ordinance as a way to justify parking reductions and/or limit a development’s impact on the city and

regional transportation infrastructure. Such ordinances may also cover bicycle parking, preferential carpool parking, pricing incentives for parking, employer subsidies of employee transit passes, and on-site access for employees to transit passes and schedules. For a thorough examination of TDM in theory and practice, see PAS Report Number 477, *Transportation Demand Management*.

Residential Parking Requirements

The amount of parking required for residential uses is, almost without exception, expressed as a ratio related to the number of dwelling units. Requirements typically range from one to two required spaces per unit. Some communities make distinctions based on whether the dwelling is in a multi- or single-family building. Others make further distinctions based on the number of bedrooms in multifamily units, the location of the units in the community, or whether the units serve senior, low-income, or other special populations that are less likely to own automobiles. In Jefferson County, Kentucky, for example, single-family dwellings and duplexes must provide one parking space per dwelling unit. While multifamily dwellings located in the Traditional Neighborhood and Traditional Marketplace Corridor Form Districts must also provide one space per dwelling unit, multifamily dwellings elsewhere must provide 1.5 spaces per dwelling unit. Senior citizen or retirement facilities have a lower requirement of one space for every two dwelling units and one space for every two employees “on maximum shift.” As regards residential parking requirements overall, Litman (1999) notes that communities should be mindful of the impact standards may have on housing affordability; specifically, he says ‘planners can play a role in encouraging developers to ‘unbundle’ the cost of housing from the cost of parking so that those who use residential parking spaces are the people who pay for it.’”

A Note about Variances

A majority of communities allow parking reductions through a variance process. Although there are advantages to examining parking requirements on a case-by-case basis, doing so may result in inconsistency from one project to the next. And for communities that act “by the book” on variances, reducing parking requirements may be a stretch given that many codes, based on state enabling legislation, require that variances must be based on factors unique to the characteristics of a particular parcel, rather than a blanket jurisdictional charge.

SUMMARY

A community’s parking policies and regulations have a great deal of influence on how that community will evolve over time. This chapter has covered the requirements and rationale related to off-street parking in a sample of communities varying in size and regional location. The body of this PAS Report presents the requirements of many communities that have dealt with the complex issues outlined above. The off-street parking puzzle includes a wide range of additional pieces not addressed in this chapter, including fees in lieu of parking (Shoup 1999a), parking cash-out policies (Kodama et al. 1996), federal policies on off-street parking (FTA 2002), size and stall dimensions (NPA 1992), and adaptive reuse of that do not conform with current parking requirements (Beaumont 1993). The relationship between land use and transportation is becoming increasingly complicated at the city, regional, and national levels with many communities facing high land values, the high cost of transportation infrastructure, and the heavy use of such infrastructure. Those communities that look for in-

novative ways to manage off-street parking—a key link between land use and transportation—may be best prepared to tackle these problems.

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Source: Bellevue Land Use Code, Title 20; September 25, 1978
Shared parking standards, Section 20.20.590(I)
- n Cambridge, Massachusetts
Source: Cambridge Zoning Ordinance; September 8, 1969
Maximum number of parking spaces in the North Point Residence District;
Article 16, Section 16.51.21.
Off-street parking requirements; Section 6.36
- n Davis, California
Source: Davis Zoning Code, Chapter 40; no date
Off-street parking requirements, including bicycle parking; Section 40.14.090
- n Grand Rapids, Michigan
Source: Grand Rapids Zoning Code, Title 5; August 24, 1999
C3 Central Business District Zone, automobile and bicycle parking; Section 5.167
- n Greensboro, North Carolina
Source: Greensboro Unified Development Ordinance; July 1, 1992
Regulations of the East Market Street Pedestrian Scale Overlay District Established;
Section 30-4-4.7(C)
- n Helena, Montana
Source: Helena Draft Unified Development Ordinance; November 2001
Maximum number of parking spaces; Section 11-15-08
- n Holland, Michigan
Source: Holland Zoning Code, Chapter 39; March 1, 2000
Parking in the C-3 Central Business District; Section 39-52
- n Iowa City, Iowa
Source: Iowa City Zoning Code; December 19, 1995
Off-street parking requirements, including bicycle parking; Section 14-6N-1
- n Minneapolis, Minnesota
Source: Minneapolis Zoning Code, Title 20; November 12, 1999
Shared parking standards; Section 541.190
Parking regulations in the Pedestrian Oriented Overlay District; Section 551.140
Parking limitations in the Downtown Parking Overlay District; Section 551.740
and Section 551.760

▫ Pittsburgh, Pennsylvania

Source: Pittsburgh Zoning Code, Chapter 914; August 24, 2000

Purpose statement of off-street parking, loading, and access chapter; Section 914.01.A.

Off-street parking requirements; Section 914.02.A Schedule A

Special exceptions to off-street parking requirements; Section 914.07.G.2

▫ Portland, Oregon

Source: Portland Planning Code, Chapter 33; July 1, 2002

Purpose statement of off-street parking and loading chapter; Section 33.266.110

Parking in the Central City Plan District; Section 33.510.261

Off-street parking requirements; Section 33.266.110

▫ Redmond, Washington

Source: Redmond Community Development Guide; November 15, 2001

Off-street parking requirements; Section 20D.130

▫ Richmond, Virginia

Source: Richmond Zoning Code; June 25, 1990

Intent of the Parking Overlay Districts; Section 32-900.1

▫ San Antonio, Texas

Source: San Antonio Unified Development Code; May 3, 2001

Exceptions to maximum parking requirements; Section 35-526(b)(5)

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▫ Santa Cruz, California

Source: Santa Cruz Zoning Code; Title 24; January 29, 1985

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