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Parking Supply Management

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PARKING SUPPLY MANAGEMENT

The management of parking supply is one important strategy for discouraging solo driving and encouraging use of ridesharing, transit, cycling and walking.

Examined here are six parking supply strategies:

- Preferential parking for car and vanpool patrons.
- Reduced minimum requirements in parking codes.
- Maximum parking requirements in parking codes.
- Caps on the overall supply of parking.
- Timed curb parking.
- Peripheral parking combined with shuttles.

I. Preferential Parking

A. Nature of Strategy

Definition: Desirable parking spaces are set aside for car and van pools as well as clean fuel vehicles.

How It Works: Provides incentive for desirable mode by allowing access to close in, covered, secure or otherwise attractive parking spaces.

B. Most Applicable Contexts

Can be applied both on and off-street, but most commonly applied off-street. Can be applied in public or private parking facilities. Especially appropriate in lower density areas where transit options are minimal. More applicable where parking demand meets or exceeds supply, to provide an incentive for use.

C. Keys to Effectiveness

All depends on the relative attractiveness of preferential parking. For example, in large, well utilized parking lots, stalls close to entrances will provide a shorter walk and possibly a sense of enhanced security. Other attractive parking options also may be effective. For example, covered, well lit parking might be designated as preferred, compared with surface and outlying parking areas. Effectiveness may be blunted in areas where transit use is substantial, as preferential parking may encourage some switching from transit to carpooling.

Experience shows mixed effectiveness. Early case studies of preferential parking by location indicated the tactic may well boost carpooling: Programs at Arkansas State Government in Little Rock, Hallmark Cards in Kansas City, Missouri, Government Employees Insurance Company in Bethesda, and the U.S. Pentagon showed increases averaging about 100 percent in carpool rates.[1] Reports of two more recent programs also suggest some success, one at Nike, Beverton, OR[2] and another at Geico, Washington, D.C.[3] But other evaluations show some ineffective programs:

- *Seattle, WA:* The city has encouraged carpool preferential parking at numerous employment sites in the downtown by requiring developers to reserve a minimum of 20 percent of parking spaces for carpools. Early results from the set aside policy showed very little use of preferential spaces by employees. More recent evaluations by City staff continue to show mixed results.[4]
- *Sunnyvale, CA:* This California City also required certain developers to designate close in parking. Again, few if any carpoolers used the stalls.[5]

D. Implementation

Policy Instruments: Public parking authorities can implement by administrative action. Developers can be required to implement through trip reduction ordinances and/or developer agreements. Employers can work with building managers to designate preferential stalls, informally or secured as part of space lease.

Administration, Operations, Monitoring: Parking operators, building management and/or employers set rules of use and monitor use. For example, rules address whether rideshare patrons must arrive together to be eligible for stalls or if drop off is allowed, also whether vehicles must be registered and display permits. Spot check monitoring determines if ineligibles are poaching stalls and whether eligible rideshare patrons are continuing to pool. If parking collection or attendant personnel already are present, the added effort of monitoring carpoolers will be small. However, where there are no such personnel, a transportation or parking coordinator must be designated. Monitoring of on-street carpool stalls is difficult because there is no checkpoint to monitor arrivals as with off-street facilities.

Localities requiring or agreeing to preferential parking at new developments must monitor to insure the parking is provided. In one study of compliance, Sacramento County found "very few" had implemented the required facilities.[6]

E. Extent of Current Use

Overall: Designated spaces for rideshare patrons are quite common; designated spaces for clean fuel vehicles are very rare.

Some examples of long standing employer programs include:

- Employers including Hallmark Cards, Government Employees Insurance Company, U.S. Pentagon, Aetna Life Insurance Company, Electric Boat Company, Perkin-Elmer, and Gulf Oil have offered preferential parking by location[7].
- Santa Cruz County designates carpool parking for employees, as do several other city and state governments.[8]
- Employers in downtown Seattle have offered close in parking for carpoolers as a result of City requirements.[9]
- Programs of preferential parking by location are in place in Philadelphia, Minneapolis, Baltimore, Prince Georges County (MD), Greensboro (NC) and San Antonio.[10]
- The City of Sacramento plans to test preferential parking for low emission vehicles in the Midtown section of the City, but no other such programs are apparent in the literature.[11]

II. Reduced Minimum Parking Requirements

A. Nature of Strategy

Definition: Reduces the amount of parking developers are required to provide as specified in zoning codes.

How It Works: Localities exert control over parking supplies through the zoning code. Usually, parking codes establish the amount of parking developers must provide ("minimum" required). Localities can allow reductions in minimum requirements (sometimes called "flexible" requirements) in return for developer agreements to support transit, carpooling, cycling or for payment into a municipal parking or traffic mitigation fund.

B. Most Applicable Contexts

Best prospects for realizing reductions in auto use through parking supply restraints are where some or all of the following conditions apply:

- Developer and lender preferences or minimum parking codes result in more parking than is utilized. In such settings, minimums might be lowered if they are the cause of overly ample supplies.
- Mixed uses are available or planned where parking supplies can be shared. In this setting, localities can negotiate for parking supplies serving several compatible uses instead of separate and more extensive supplies serving each use.
- Commercial and public parking is well utilized, thereby limiting opportunities for parkers to simply shift parking locations as supplies are tightened.

- The costs of providing parking are high compared to traffic mitigation alternatives. In such settings, developers and lenders may be more willing to reduce supplies.

- Transit capacity is frequent and not saturated, offering a good alternative for drivers affected by tightened supplies.

- Uncontrolled supplies (streets, vacant land, neighborhoods) are at a minimum or new controls and or enforcement are planned.

One candidate for reduced minimums may be lower density, suburban areas. Supplies in these communities tend to exceed demand. Surveys of suburban office parks show supplies between 3.5 and 4.0 spaces per 1,000 square feet of floor space, and surveys of usage in California and Texas found office workers only required about 2.2 spaces per 1,000 square feet.[12] Recent surveys in King and Snohomish Counties, Washington also indicate excess supplies.[13] These same lower density, suburban communities may also be sites for new mixed use developments where parking can be shared across uses.

More dense urban areas also may provide opportunities. Here, the high cost of parking may encourage developers to seek reduced parking in return for traffic mitigation strategies. Or, if parking subsides are to be reduced or cashed out, parking requirements might be reduced to be more in line with new anticipated parking demand. Finally, parking requirements may be reduced in proximity to transit stations where employee transit use may well reduce parking demand.

C. Keys to Effectiveness

The intended effect of reduced parking minimums is less solo driving and increased use of transit, carpools, walking and cycling. Effectiveness depends how the required supply relates to parking demand. In the best case, reduced parking supplies encourage less auto use and parking. However, if the minimum is too low relative to actual parking demand, "spillover" parking might result. In the case of commuters, they may park in neighborhoods or retail areas or on street at meters and timed zones as a result of insufficient off-street parking. Consequently, important adjuncts to parking minimums are preferential parking for residents, enforcement against meter feeding and parking over time limits in timed zones.

The effectiveness of reduced parking requirements also depends on how developers respond. Developers and lenders may choose not to provide the minimum if they perceive it as too low relative to demand, or if the alternative to providing the minimum is not attractive. Experience suggests this strategy has had mixed results in attracting developers to reduce parking supply. For example:

- Few developers in *Seattle, WA or Hartford, CT* opted for reduced minimum requirements in return for additional carpool stalls, transit pass sales, contribution to the in-lieu fund or peripheral parking.[14]

- *Chicago, IL* offers reductions in the amount of required parking for buildings connected to underground transit stations and for underground pedestrian circulation. Developers take advantage of reduction for connections, but not for pedestrian circulation, claiming it is too expensive to do so.[15]

- *Orlando, FL* experienced the same unwillingness to reduce parking below the minimum, in this case in return for contributions to a transportation management trust fund.[16]

D. Implementation

Policy Instruments: Zoning codes specify terms and conditions for reductions. For example, the code might specify the proportion or percent of spaces which can be reduced for such specific programs as designated carpool stalls, transit pass sales or on site carpool matching services. Where conditions are more complex or tailored to each development, or very large developments, a developer agreement is sometimes used to specify developer obligations. It is important to insure agreed to programs continue beyond a change in property ownership. A land covenant may be used for this purpose.

Administration, Operations, Monitoring: Localities agreeing with developers for reduced parking

requirements must monitor new developments to insure the agreed to programs (carpool and transit encouragements) or facility improvements (e.g. information displays, carpool stalls, bus turn outs, bike racks) are provided. As previously mentioned, in one study of compliance under such developer agreements, Sacramento County found "very few" had implemented the required facilities.[17] Of course, if the agreement involves payment of an in-lieu fee, checking compliance is a simple matter of verifying payment.

In-lieu fee programs present special administrative issues. Fee collection and expenditures on promised transportation or parking programs must be credible and prompt to encourage developer contributions. In the case of Calgary, Canada, developers objected to the program because promised municipal parking structures peripheral to downtown were slow to develop.[18]

E. Extent of Current Use

Overall: Used in a several localities active in trip reduction programs.

For Example: The City of Hartford, Connecticut, reduces minimum required parking in return for developer carpool and transit encouragements. Similar reductions in minimums are found in Palo Alto and Sacramento, California; Chicago and Schaumburg, Illinois; Seattle, Washington; and Dallas, Texas. Montgomery County, Maryland reduces minimum requirements in proximity to rail stations. Phoenix, Arizona allows relaxations in proximity to bus transit. Calgary, Canada and Orlando, Florida have required or allowed payments "in-lieu" of on-site parking. In Calgary, fees support municipal parking, whether central or peripheral to downtown; in Orlando, they support a transportation management program.[19]

III. Parking Maximums

A. Nature of Strategy

Definition: Limits the amount of parking developers may provide as specified in zoning codes.

How It Works: Localities control parking supplies through the zoning code. Usually, parking codes establish the amount of parking developers must provide ("minimum" required). Localities can set maximums ("maximum" which can be provided) to insure overly ample supplies are not provided. Such maximums may be in addition to minimums or stand alone.

B. Most Applicable Contexts

Best prospects for reductions in auto use through parking maximums are similar to those for reduced minimums:

- Developer and lender preferences or minimum parking codes result in more parking than is utilized. In such settings, minimums might be lowered and new maximums developed if code requirements are the cause of overly ample supplies.
- Mixed uses are available or planned where parking supplies can be shared. In this setting, localities can develop maximums for parking supplies serving several compatible uses instead of separate and more extensive supplies serving each use.
- Commercial and public parking is well utilized, thereby limiting opportunities for parkers to simply shift parking locations as supplies are tightened.
- Transit capacity is frequent and not saturated, offering a good alternative for drivers affected by tightened supplies.
- Uncontrolled supplies (streets, vacant land, neighborhoods) are at a minimum or new controls and or enforcement are planned.

One candidate for maximums may be lower density, suburban areas. As discussed under reduced parking minimums, supplies in these communities tend to exceed demand.[20] These same communities also may be sites for new mixed use developments where parking can be shared across uses.

More dense urban areas also may provide opportunities. Here, the high cost of parking may

encourage developers to support new maximums. Or, if parking subsides are to be reduced or cashed out, parking maximums might be reduced to be more in line with new anticipated parking demand. Finally, parking maximums might be reduced in proximity to transit stations where employee transit use may reduce parking demand, especially in suburban and lower density situations where evidence suggests parking supplies often are overly ample.

C. Keys to Effectiveness

As with reduced parking minimums, the intended effect of reduced parking minimums is less solo driving and increased use of transit, carpools, walking and cycling. Effectiveness depends on how the supply resulting from the policy relates to parking demand. In the best case, the tight supply encourages less auto use and parking. However, if the maximum is too low relative to actual parking demand, "spillover" parking might result--such as commuters parking in neighborhoods or retail areas or on street at meters and timed zones as a result of insufficient off-street parking. It is not a simple matter to accurately estimate parking demand and set maximums accordingly. For example, in Portland, Oregon several building developers have provided considerably less than the maximum, raising the issue of whether the maximum is perhaps set too high. Several developers provide one space per 1,200 square feet where the maximum is one space per 1,000 square feet.[21] As with reduced minimums, important adjuncts to parking maximums are preferential parking for residents, enforcement against meter feeding and parking over limits in timed zones.

There is an important difference between reduced parking minimums and parking maximums when it comes to the consequences of incorrectly estimating parking demand. Reduced minimums allow developers the choice of providing the minimum or something more than the minimum. However, maximums are an absolute limit on the amount of parking which may be provided. Thus, even if a local minimum zoning code underestimates the amount of parking required for developments, developers and lenders have the opportunity to make a closer estimate of demand and provide more than the minimum. Maximums are not so tolerant of errors in estimated parking demand. If a locality underestimates parking demand and sets maximums too low, developers cannot "second guess" the jurisdiction and provide more parking.

Effectiveness of parking maximums has not been well evaluated. Experience in two cities with maximums suggest the policies possibly are effective in increasing or maintaining transit use, but other important variables are at work in both cities, which confound the picture:

- *Bellevue, WA,* with a maximum for office use, has shown an increase in transit ridership from 4 percent in 1980 to 11 percent in 1992.[22] However, over the same period as the maximums came into effect, transit service has been increasing, a transit center developed, local street HOV lanes were added, and parking prices have been increasing.

- *Seattle, WA* has maintained a relatively high transit share downtown of 45%[23] while imposing a maximum requirement of one space per 1,000 square feet. However, at the same time, the City has imposed requirements on developers to encourage transit and improved transit service in the downtown.

D. Implementation

Policy Instruments: Zoning codes specify maximum terms and conditions for reductions. For example, the Bellevue maximum ranges from 2.7 to 3.5 spaces per 1,000 square feet depending on the zone within the downtown. Zones might be established based on degree of transit service, type of use and expected employee densities, as well as variations in carpool, walk and cycling rates.

For complex projects, a developer agreement might specify allowed parking at development phases with the aim of achieving no more than the maximum in the final phase.

Administration, Operations, Monitoring: As with any parking requirement, monitoring through development is required to insure no more than the maximum is provided. Where the maximum is coupled with special agreements or ordinances requiring developer and/or employer trip reduction programs, then monitoring must insure the programs (carpool and transit encouragements)

or facility improvements (e.g. information displays, carpool stalls, bus turn outs, bike racks) are provided.

Maximum standards may be phased over time. The Bellevue, WA program provides for a reduction in both the minimum and maximum of 0.3 spaces/1,000 sf every two years. However, the city has not implemented the reductions as less than anticipated transit service has developed.[24]

E. Extent of Current Use

Overall: Use limited to a few localities

For Example: Seattle, Bellevue, and Redmond, WA; Portland, OR; San Francisco, CA; Toronto and Vancouver, Canada.[25] A recent survey of 127 zoning ordinances across the United States found only one jurisdiction--Bellevue, Washington--employing maximums.[26] A new state trip reduction law in Washington encourages adoption of maximums in all city and county codes, and King, Snohomish and Spokane counties in Washington are proposing maximums.[27] Maximums have been studied in detail and are recommended for adoption in Honolulu, Hawaii both for downtown and Waikiki.[28]

IV. Areawide Parking Caps

A. Nature of Strategy

Definition: Limits the total supply of parking in an area.

How It Works: A locality can limit overall supply of parking in an area through combined policies targeted to an overall cap. A parking management plan and policy, for example, might set maximum parking ratios, forbid construction of free standing garages or even surface lots, allow construction of new buildings without parking, and revise pricing structures in public facilities all with the intent of limiting both the demand for and supply of long term parking.

B. Most Applicable Contexts

Best prospects for reductions in auto use through areawide controls are where some or all of the following conditions apply:

- Developer and lender preferences or minimum parking codes result in more parking than is utilized. In such settings, areawide caps are one way to reduce overly ample supplies.
- Commercial and public parking is well utilized, thereby limiting opportunities for parkers to simply shift parking locations as supplies are tightened.
- Transit capacity is frequent and not saturated, offering a good alternative for drivers affected by tightened supplies
- Uncontrolled supplies (streets, vacant land, neighborhoods) are at a minimum or new controls and or enforcement are planned.

As with other supply limit approaches, one candidate for caps may be lower density, suburban areas. As discussed under reduced parking minimums, supplies in these communities tend to exceed demand.[29] These same communities also may be sites for new mixed use developments where parking can be shared across uses.

More dense urban areas also may provide opportunities. The high cost of parking, new programs to reduce or cash out parking subsidies, or new transit service may provide opportunities for implementation of parking caps.

C. Keys to Effectiveness

The supply of parking in an area is one determinant underlying commuter choice of travel mode. Generally, the tighter the parking supply, the more likely drivers will consider using alternative modes. The relevant "supply" includes all available parking to commuters, both on and off-site within walking distance. Evidence for the importance of parking supply comes from two recent studies:

- One review of demand management programs in Seattle found both price and availability of parking were important determinants to the proportion of solo drivers. However, by comparing buildings with relatively high parking prices and good transit service, but differing in terms of the availability of parking, the study found the most solo driving where parking was ample.[30]

- Likewise, a recent study of parking and transit use at San Francisco hospitals found parking price the single most important determinant, "accounting for up to 80 percent of the variation in mode splits among six institutions." However, the availability of off-site parking and nearby transit service were next most important in determining the degree of employee auto use.[31]

As with reduced parking minimums or parking maximums, the intended effect of a cap policy is less solo driving and increased use of transit, carpools, walking and cycling. Effectiveness depends on how the supply resulting from the policy relates to parking demand. In the best case, the tight supply encourage less auto use and parking. However, if the supply is too low relative to actual parking demand, "spillover" parking might result--such as commuters parking in neighborhoods or retail areas or on street at meters and timed zones as a result of insufficient off-street parking. As with all supply controls, important adjuncts to the cap are preferential parking for residents, enforcement against meter feeding and parking over limits in timed zones.

Experience with parking cap policies has been limited and mixed with other transportation policies making it difficult to determine effectiveness with confidence. Portland and San Francisco provide the two relevant cases where it appears the policies possibly are effective in increasing or maintaining transit use. However, the parking cap in Boston does not appear effective:

- *Portland, OR:* In 1975, the city set an overall cap of approximately 40,000 parking spaces downtown, including existing space, approved but not built spaces, and a remainder termed "reserve" from which space for new development is allocated. The cap moved up to about 44,000 spaces by the late 1980's, and has moved up again recently with the implementation of new simultaneous efforts (termed "offsets") to reduce vehicular traffic. Thus, the case represents a moving rather than fixed cap. And combined with the policy are transit improvements, new employer work hour programs, carpool and transit promotions. The City is generally satisfied with its parking policies and believes it has helped increase transit use from 20 to 25 percent in the early 1970's to a level of 48 in recent years. The carpool rate is 17 percent.[32]

- *San Francisco, CA:* The City "Transit First" policy allows parking to consume only up to seven percent of a building's gross floor; new buildings must have an approved parking plan prior to receiving an occupancy permit. In some cases, only short term parking is approved; in another, a mix of long, short and carpool parking was approved. City planners indicate there has been no major increase in peak traffic over the past ten years in spite of considerable office growth. Local transit ridership is steady. A 1983 survey of workers in the downtown (C-3 zone) showed 60 percent ride transit, 16 percent rideshare and 17 percent drive alone.[33]

- *Boston, MA:* In 1977, the City of Boston adopted a freeze on commercial parking open to the public, not parking reserved for individuals or a company use within office buildings. While the number of commercial spaces have not increased, there has been a 26 percent increase in exempt spaces between 1984 and 1987 alone. Traffic has increased dramatically along major corridors to the city.[34]

D. Implementation

Policy Instruments: A downtown parking plan is the usual enabling policy. It may contain not only a formal or informal cap, but parking code provisions such as maximums and minimums; requirements for site specific parking plans; prohibitions on free standing garages; parking rate schedules for municipal parking garages; and other provisions. Supplementing the policy, especially for complex and large new developments, might be developer agreements specifying particular parking conditions.

Administration, Operations, Monitoring: Implementing a comprehensive cap policy may require considerable administrative effort. Periodic parking surveys, studies, plan and policy updates may be needed to make ongoing decisions about the overall level of the cap, how to allocate the allowed inventory by zone (Portland allocates its "inventory" over several zones), what exemptions to allow and how the cap should vary over time in light of air quality regulations and new programs to reduce traffic.

Clearly the administrative, planning and decision making requirements are more complex and demanding than those associated with implementing maximum or minimum parking code policies. Additionally, commercial and development interests are certain to exert periodic pressures to increase the supply or broaden exemption, as has taken place in Boston and Portland.

E. Extent of Current Use

Overall: Very little use

For Example: Portland, OR; San Francisco, CA; and Boston, MA. Caps do not appear to be under consideration in any cities at this time.

V. Timed Curb Zones

A. Nature of Strategy

Definition: Regulates parking time on street.

How It Works: In most U.S. localities, limits are posted by sign on-street to indicate how long parking is permitted. Outside the U.S., some jurisdictions use disks or permits to regulate timed parking, whereby a dial indicator or punch out shows time of arrival. Enforcers chalk tires and/or note license plate numbers to enforce time limits, or note expiration time for disks and permits. New hand held electronic devices allow enforcers to spot vehicles with large numbers of unpaid violations. Some jurisdictions "boot" and tow such vehicles so they cannot be driven until fines are paid.

B. Most Applicable Contexts

Used in commercial zones to encourage turnover of shoppers and discourage long term commuter parking. Also used in neighborhoods to discourage commuter parking, with exemptions given to residents ("preferential parking").

C. Keys to Effectiveness

Curb parking management serves as a support strategy for other measures and programs aimed at reducing auto use. For example, it supports both restraints on the supply of off-street parking (e.g. reduced minimum requirements, maximum requirements and caps on areawide supplies) as well as parking pricing measures (e.g. increased parking pricing for commuters, removal or cash out of employer parking subsidies, parking taxes). In short, it supports any program attempting to shift commuters away from solo driving by minimizing commuter "spillover" onto streets intended for shoppers or residents.

There have been no evaluations of the effectiveness of timed curb zones in boosting use of transit, carpooling and other alternatives to solo driving. However, dated evaluations have been done of how increased enforcement stems violations of on-street regulations, including timed zones. Presumably such enforcement encourages more commuters to use off-street parking and, where such parking is tight and expensive, to use transit and carpools.

The most carefully evaluated cases are in Washington, D.C. and Cambridge, Massachusetts. In Washington, D.C., an enhanced enforcement program employing 50 enforcers, nine two person booting crews and 25 private contract towing cranes dramatically increased ticketing and reduced parking violations. Tickets increased 38 percent over the five year evaluation period, booting increased 275 percent and towing increased 187 percent. The result was a drop in parking violations per block from 5.85 to 1.90 in the central business district and from 2.6 to 1.5 in residential areas. Long term parking (presumably by at least some commuters) fell and short term parking (presumably mostly shoppers) grew, as evidenced by an increase in parking turnover from 1.7 to 2.1 vehicles per hour.[35]

Another assessment[36] of increased enforcement and booting in Boston concluded, "parking lots also appear to be more heavily used since the introduction of booting ..." underscoring the importance of on-street management in commuter travel and parking choices.

D. Implementation

Policy Instruments: Parking ordinances establish timed zones, regulations and penalties against violation. Ordinances or charters also establish department responsibility as to police versus civilian duties and legal authority for administrative adjudication, if needed.

Administration, Operations, Monitoring: Establishing on-street timed parking zones through regulation and signing is a small part of the implementation picture. The larger part is enforcing such regulations. Lax enforcement will encourage parking beyond time limits. Strict enforcement will encourage more compliance, though some commuters can be expected to "shuffle" cars[37] within the zone.

A comprehensive and effective enforcement program entails several elements. Ticketing may be carried out by police or civilians under traffic and parking departments. Revenues, which usually exceed enforcement costs, may be used to support a variety of locality services. For example, parking enforcers wrote 2.6 million tickets in San Francisco in 1992, with fines grossing $20 million after ticket writing costs. Revenues go into the City general fund.[38] Towing and booting procedures and operations are another element, in this case aimed at scofflaw offenders. Associated operational issues include extensive staff training to minimize erroneous or inconsistent enforcement, contracts for tow services, impound vehicle security procedures, and public information.

Adjudication is the final element of the system, whether carried out by locality criminal courts or traffic departments. Such a system must quickly hear and decide cases, minimize wait time and not overburden the judicial system.[39]

E. Extent of Current Use

Overall: Timed zones are used alone or in combination with parking meters in most medium to large cities in the U.S.

For Example: While timed zones are common in many cities, aggressive and strict enforcement programs combining enforcement, towing and booting are documented in fewer cities, including Boston, Washington, D.C., San Francisco, Colorado Springs and Billings, Montana.[40]

VII. Peripheral Parking/Shuttles

A. Nature of Strategy

Definition: Parking on the periphery of downtown or activity centers served by shuttles or transit.

How It Works: Localities establish peripheral parking outside the main core area of an activity center. Parking may be owned or leased by the locality, or secured by developers. Shuttle service may be developer or employer operated, or operated by a transit district. Parking may be open to all or designated for car and vanpools.

B. Most Applicable Contexts

Best prospects for realizing reductions in auto use through peripheral parking are where some or all of the following conditions apply:

- Commercial, lease and public parking is well utilized and expensive, whereas peripheral parking is readily available, secure and free or low cost.
- The costs of providing parking on site are high (e.g. in structures or underground) compared to securing outlying parking. In such settings, developers and lenders may be more willing to consider peripheral parking.
- Transit capacity or shuttle service to/from lots is frequent and not saturated.

- Alternative parking supplies (streets, vacant land, neighborhoods) are at a minimum or new controls and or enforcement are planned.

More dense urban areas provide the best opportunity for peripheral parking. Here, the high cost of parking may encourage developers to seek reduced parking in return for traffic mitigation strategies. Or, if parking subsides are to be reduced or cashed out, commuters may feel an incentive to seek lower priced peripheral parking.

C. Keys to Effectiveness

The intended effect of peripheral parking is less traffic on activity center streets, along with reductions in emissions associated with stop and go driving. The effectiveness of the strategy in reducing congestion and emissions greatly depends on where the most congestion appears. If most of the congestion and travel delays occur on freeways leading into an activity center as opposed to on streets within the center, then peripheral parking may have little impact on congestion and associated pollution.

Another key to success relates to the target market. Peripheral lots may attract solo drivers, carpoolers or transit users depending on their location, price, security and frequency of shuttle service. Clearly, the more solo drivers attracted the better. One survey in Seattle found 35 percent of those using park and ride lots in the region (some peripheral) previously drove alone.[41]

Localities have had difficulty encouraging implementation of peripheral parking systems:

- *San Francisco, CA:* The City has identified potential fringe parking lots (mostly now utilized by Caltrans, the State highway and transportation agency) for possible development of park and ride facilities. The City intends for private developers to develop the lots and implement shuttle systems as an alternative to providing parking on site. For now, no developers have come forth with proposals to implement peripheral parking as a way to beat the high price of providing parking on site, as planners believed might happen or yet happen.[42]

- *Hartford, CT:* The city instituted a policy allowing parking requirements for new developments to be reduced by up to 30 percent for shuttle service from off-site parking. Additionally, through administrative review procedures rather than code, the City requires office developers to put new parking underground. The intent was to encourage parking off-site and shuttle service. City planners hoped developers would provide peripheral parking and shuttles as a result of requirements for underground parking and reductions in required on-site parking. Instead, developers lease nearby surface parking where available and provide it to tenants.

- *Orlando, FL:* Under the 1982 downtown "parking district overlay ordinance," a developer could avoid construction of up to 20 percent of required parking in exchange for contributions to a transportation management trust fund. Contributions were based on 80 percent of the construction cost of parking stalls not built. No contributions were made to the trust fund as of 1986. Developers and lenders claimed it was important to provide at least the minimum required parking to stay competitive in the office market place.[43] Since the time of this research, the City itself has constructed 8,000 spaces at the periphery of downtown, but the program has not been evaluated.[44]

On the other hand, there are some success stories with peripheral parking facilities and shuttles pointing to the importance of the particular market user and, especially, the supply and price of parking in the area served by the shuttle:

- *New Orleans, LA:* In the mid 1970s, the City operated a successful shuttle service from the Superdome to the CBD, where 85 percent of the 5,000 spaces were occupied on a typical day. Estimates are the program shifted about 1,200 cars from parking in the central part of the city.[45] However, high cost of the operation and low parking and shuttle fees created a large deficit. Attempts to increased rates reduced ridership significantly.[46]

- *San Jose, CA:* A free remote lot for employees of the San Jose Medical Center two blocks from the hospital attracts some use, but many employees continue to park on street in adjacent residential neighborhoods.[47]

- The *University of Maryland* has operated a successful shuttle program of 25 buses serving 750,000 annually. Routes serve parking areas, residential areas, campus, and the regional public transit system.[48] Of course, because students generally own fewer cars and earn less than commuters, they probably are attracted more to transit than employees. Also, colleges exert more control over students than employers exert over commuters. For example, M.I.T. does not grant parking permits to students if they are within the service area of the regional public transit system.[49] UCLA also considers proximity to transit in allocating parking permits.[50]

- Recreational Shuttles: *Capitola, CA* has operated a successful beach shuttle for ten years. Parking meters and residential preferential parking along the beach contribute to its success.[51] Other successful beach shuttles operate in Santa Barbara, Monterey, and San Diego. Funding usually comes from a combination of hotel taxes, general funds, fares, and parking revenues.

- *Denver, CO:* A downtown Denver shuttle has been successful in part because it operates in a "transit mall" where auto use is restricted. Twenty-six shuttle buses carry passengers along the mall, and about 48,000 passengers ride per weekday.[52]

D. Implementation

Policy Instruments: Depending on the scale of the program, an adopted master plan and special ordinance may be required. If tied to reductions in parking requirements, parking code revisions may be required. Developer agreements, lot leases and possibly transit district or shuttle provider contracts are other possible policy instruments depending on the type of program.

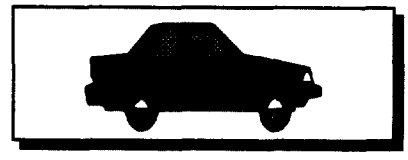
Administration, Operations, Monitoring: Considerable planning is needed to determine best locations for intercepting trips. The location also should have minimal adverse impact on adjacent properties. For lots owned by the jurisdiction, maintenance and security are important considerations. For lots leased, leases must be negotiated including hours of operation, security and maintenance standards, liability, term, and termination notice. For any program to succeed, an ongoing marketing effort is needed, probably in cooperation with activity center employers and merchant associations.

The source and longevity of funding is another key operational issue, as the case of New Orleans suggests. Where in-lieu fees are the supporting mechanism, fee collection and expenditures on promised transportation or parking programs must be credible and prompt to encourage developer contributions. In the case of Calgary, Canada, developers objected to the program because promised municipal parking structures peripheral to downtown were slow to develop.[53] Finally, given mixed results with this strategy, monitoring of lot usage, prior mode of users and shuttle ridership are important.

E. Extent of Current Use

Overall: Modest usage in cities

For Example: A dated survey of 173 cities spanning all city sizes found 29 percent of respondents had constructed peripheral lots where users either walk or ride transit to final destinations.[54]



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