

Parking Management and Traffic Mitigation in Six Cities: Implications for Local Policy

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Local jurisdictions are using parking management and traffic mitigation policies to discourage solo driving and encourage transit, ridesharing, cycling, and other alternatives to solo driving. This paper focuses on selected policies in six cities, including parking code requirements, encouragements for fringe or peripheral parking, preferential parking for carpoolers, and requirements on new office developments (e.g., through developer agreements) for owner-sponsored traffic mitigations. Included in the review is a synopsis of literature on peripheral parking as several of the cities surveyed are planning or implementing this strategy. The review examines the status of current parking management and traffic mitigation policies and issues of implementation and effectiveness; then it draws policy implications for localities.

The paper is organized in three sections. First is a summary of findings in six jurisdictions surveyed for this study. The jurisdictions are Portland, Oregon; Seattle, Washington; San Francisco and Los Angeles, California; Denver, Colorado; and Hartford, Connecticut. Second is a brief review of peripheral parking literature. Third is a summary with implications for localities.

REVIEW OF PARKING MANAGEMENT AND TRAFFIC MITIGATION IN SIX CITIES

Portland, Oregon

Background Information

Population Downtown employment is about 90,000; residential population is 380,000; standard metropolitan statistical area (SMSA) population is about 1.2 million.

Parking Supply There are 41,000 spaces in the central business district (CBD), with 8,100 publicly owned (5,500 are on-street meters); the balance are privately owned and operated with most open to the public.

Parking Rates Public rates off-street are \$65.00 per month, but few monthlies are allowed; daily rate off-street rates range from \$0.60 to \$1.00 per hour. On-street meters average \$0.50 per hour depending on the zone. Private off-street rates range from \$87.50 to \$35.00 per month. Some private commercial

lots offer early bird specials, ranging from \$3.50 to \$5.50 per day.

Parking and Traffic Mitigation Policies

Parking Policy The city fixes the number of allowed off-street and on-street parking spaces with the intent of limiting automobile use. The current lid is set at 43,914. Hotel and residential parking is not counted in the controlled supply. The lid includes spaces in several approved projects that are not yet built. The parking code sets a maximum number of parking spaces allowed depending on proximity to transit, with no minimum except for residential uses. Requirements in most areas are 1.0 space per 1,000 sq ft of development but range to a low of 0.7 spaces per 1,000 sq ft. Parking is approved by conditional use permit only. It is allocated primarily to new development, major rehabilitation, and customer or visitor parking. Surface lots are also limited to selected purposes and sizes. The city manages several residential permit programs in neighborhoods adjacent to the CBD.

Traffic Mitigation Aside from maintaining a tight parking supply, Portland discourages solo driving through carpool and transit programs. The transit district promotes carpooling and matches carpool applicants by residential location. Reserved parking spaces for carpoolers are provided in city and state garages at \$45.00 per month. The city also sells permits at \$25.00 per month to allow carpools to park at long-term meters on-street. The city has conditioned some downtown developments to provide priority parking for carpoolers, bicycle racks, transit shelters, and other traffic mitigation strategies. However, the city does not have a trip reduction or transportation systems management ordinance.

The city is studying fringe parking among other new measures (staggered work hours, employer subsidies to transit) to maintain air quality and manage traffic but has not implemented a fringe parking system.

Key Findings

The city is generally satisfied with the parking lid and believes it has helped maintain high transit usage. As much as 48 percent of commuters into the downtown have used transit in past years, although the proportion has fallen to 43 percent

in 1987. The carpool rate is 17 percent. City managers attribute the decline to falling gas prices and some reduction in transit service as a result of fiscal constraints.

The maximum parking requirement has brought both desirable and unexpected results. In accordance with the goals of the maximum policy, many developers have provided at or under the allowable level. However, several buildings have provided considerably less than the maximum, raising the issue of whether the maximum is perhaps set too high. Several developers provide 1 space per 1,200 sq ft where the maximum is 1 space per 1,000 sq ft. Close to transit, some large projects have provided 1 per 2,000 sq ft or less. Exceptions include small projects farther from transit, where developers provide exactly the maximum allowed.

Although the city has not instituted a fringe parking system, staff and consultants are concerned that a fringe system may not serve one important city objective—improved air quality. In Portland where apparently there is considerable demand for shopper parking downtown, shopper parking may replace employee parking as commuters park in the fringe lots. Shoppers generate cold starts (if parked longer than 1 hr) and short trips midday. Both occurrences can increase CO emissions.

Seattle, Washington

Background Information

Population Downtown employment is about 150,000; residential population is 461,000; SMSA population is about 2 million.

Parking Supply There are 72,000 spaces citywide; 12,000 are publicly owned (almost all are on-street metered or non-metered—no public garages downtown); the balance are privately owned and operated, with most available to the public.

Parking Rates Public rates at parking meters range from \$0.25 per hour to \$0.50 per hour depending on the zone. Private off-street rates average about \$90.00 per month. Average daily rates are \$6.00.

Parking and Traffic Mitigation Policies

Parking Policy Various city policies are set with the intent of discouraging solo driving. The city imposes a maximum requirement of 1.0 space per 1,000 sq ft. Excess supply beyond this amount is allowed only through administrative review. Minimum requirements also are established by code and vary by proximity to transit. For example, the minimum for office is 0.54 spaces per 1,000 sq ft close to transit and 0.75 in areas with moderate access to transit. At least 20 percent of parking spaces provided to meet the minimum must be reserved for carpools.

Each carpool space provided (set aside for carpool use from 6:00 a.m. to 9:30 a.m.) in addition to the minimum gains a reduction in the parking requirement of 1.9 spaces. The same reduction in parking requirement may be obtained by subsidizing parking rates for carpools by at least 30 percent of

monthly market rates. No more than 50 percent of long-term spaces can be set aside for carpools. Provision of free transit passes (for at least 5 yr) reduces the parking requirement by 15 percent. An in-lieu provision allows up to 100 percent of the long-term parking requirement to be waived for contributions to the Downtown Parking Fund. The fund may be used to construct parking anywhere in the downtown and on the periphery of downtown. New parking garages and long-term surface lots are not permitted except through administrative review.

Traffic Mitigation The zoning code establishes mitigation requirements applying to all nonresidential structures exceeding 10,000 sq ft. A transportation coordinator must be maintained on site to promote ridesharing, public transit, and flex-time and to conduct an annual employee survey. The coordinator must work with Seattle Metro, the regional rideshare and transit agency, in traffic mitigation. A transportation information center must be established in the lobby or some other visible place. Also, bicycle parking is required at the rate of 1 space for every 20 parking spaces. Before traffic mitigation requirements were added to the zoning code, the city conditioned projects through a master use permit and review authority under the state Environmental Policy Act. The city does not have a trip reduction or transportation systems management ordinance.

The city takes other action to encourage ridesharing. It encourages carpooling by setting aside 700 discounted parking spaces in off- and on-street locations. The city is surrounded by several park-and-ride lots at some distance from the downtown but no peripheral lots.

Key Findings

The city parking management and mitigation program has met with mixed results. On the positive side, city staff who have been interviewed believe that parking and mitigation policies have helped maintain the high transit share for downtown commuters. About 45 percent of downtown employees use transit, although the proportion has been dropping in the past couple of years.

On the other hand, several policies have met with mixed results. First, an evaluation of 14 projects approved between 1979 and 1982 showed that few carpools occupied set-aside spaces provided in major office developments and that considerable developer opposition existed to set-aside policies (1). Second, very few developers have been opting to reduce minimum parking requirements for additional carpool stalls, transit pass sales, or contribution to the in-lieu fund. Without in-lieu funds, it is more difficult to proceed with any peripheral parking, as once envisioned. Third, the mitigation programs are working well at some buildings but not at others. According to city staff conducting recent evaluations of mitigation programs, much seems to depend on proximity to transit, the size of employers, types of employees (clerical versus professional), and parking availability nearby. Successes are found at First Interstate and Seafirst; failures at One Union Square and Weston. Fourth, enforcement of mitigation programs has proven difficult. Three or 4 of 16 buildings subject to mitigation requirements are not in compliance. The city is reluc-

tant to enforce mitigation conditions by revoking occupancy permits as this action seems very drastic to all concerned. Fifth, city encouragement of carpooling through discount parking at some of its own facilities has met with problems. One evaluation showed that 40 percent of new poolers attracted to the lots were switching not from solo driving but from transit (2). Finally, recent observations and evaluations indicate that possibly as many as 25 percent of lot users may not be legitimate carpoolers.

San Francisco, California

Background Information

Population Downtown employment is about 250,000 (C-3 zone); the residential population for the city is about 740,000.

Parking Supply There are 38,000 spaces downtown, mostly off-street; 48,000 off-street spaces in the "greater downtown"; and about 13,000 off-street spaces publicly owned in the entire city, 11,000 of them in 13 public garages. Planners estimate that at least three-quarters of off-street parking in the downtown is privately owned and operated.

Parking Rates Public rates off-street range from about \$60.00 to \$260.00 per month, but few monthlies are allowed and provided through wait list and attrition. Hourly rates escalate to encourage short-term parking and discourage long-term parking (e.g., \$0.65 for 1st hr, \$4.25 for 4 hr, \$12.50 for 7 hr; meter rates range from \$0.50 to \$1.50 per hour). Private off-street rates equal or exceed city rates. The city regulates rates charged at private off-street parking associated with new office development through conditioning requirements.

Parking and Traffic Mitigation Policies

Parking Policy The city "Transit First" policy influences both the supply and price of parking. The newest downtown plan aims at keeping an informal lid on parking supply and emphasizes short-term over long-term parking. There is no code-required parking in the downtown (C-3) area, and only up to 7 percent of a building's gross floor area can be devoted to parking. Under the downtown plan, new buildings must have an approved parking plan before receiving an occupancy permit. Requirements of the plan are a condition for development. In some cases, only short-term parking is approved; in another case, a mix of long, short, and carpool parking was approved. Parking rates are set by the newest parking code revisions. For example, the 4-hr rate cannot be greater than four times the first hour charge. The 8-hr rate cannot be less than 10 times the first hour charge. The city manages an extensive preferential parking program throughout the city.

Traffic Mitigation The city encourages traffic mitigation through a requirement for traffic mitigation plans (TMPs) from developers and annual progress reports. The plans must

be developed and updated based on detailed guidelines issued by the city. Generally, the guidelines require designation of an on-site transportation coordinator, provision of transit and rideshare information, a biannual employee survey to track proportion of solo drivers, and implementation of various strategies such as the sale of transit passes.

The city has identified potential fringe parking lots (mostly now used by Caltrans, the state highway and transportation agency) for possible development. The city intends for private developers to develop the lots and implement shuttle systems as an alternative to providing parking on site.

Key Findings

City planners are generally satisfied that parking management strategies have helped maintain good transit use and kept automobile use to a minimum. There are no regular traffic trend or cordon count studies to support the assertion; however, planners indicate there has been no major increase in peak traffic during the past 10 yr in spite of considerable office growth. Local transit ridership is steady, although ridership on Golden Gate Transit into San Francisco has fallen in the past 2 yr. A 1983 survey of workers in the downtown (C-3) zone showed that 60 percent ride transit, 16 percent rideshare, and 17 percent drive alone (3).

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 might yet happen. Nor do developers or lenders object to the current limit on parking supplies on-site. Asked why some major companies, such as Bank of America, have removed some functions to suburban office centers, planners indicate that parking and mitigation policies are not the reason. They indicate that the cost of office space and land is the primary reason and point to continued growth in the city.

Developers do object to the regulation of parking pricing but not to requirements for TMP plans. The city is searching for ways to assist developers in preparing plans. The local rideshare agency, RIDES, cannot provide sufficient staff to help prepare plans. There are now about 60 buildings with TMP requirements.

Planners say developers and parking operators comply with the letter of the code on parking pricing rates but sidestep the main intent of requirement—discouraging long-term parking in favor of short-term parking. The city would not cite specific examples but did indicate the need to evaluate and possibly change the pricing regulations.

Los Angeles, California

Background Information

Population Downtown employment is about 200,000; SMSA population is now 3.3 million.

Parking Supply According to projections for 1990 in the CBD, there will be about 127,000 off-street spaces with 81,300 in facilities available to the public and 45,700 restricted to private use. Curb parking will make up about 5,000 spaces.

Parking Rates Public rates off-street range up to \$0.50 per hour; on-street rates go up to \$1.00 per hour, according to the Institutional and Municipal Parking Congress data.

Parking and Traffic Mitigation Policies

Parking Policy City parking policies are changing to encourage more use of transit and ridesharing. Parking requirements are a minimum of 2 per 1,000 sq ft of development, soon to be increased to 3 per 1,000. However, a lesser requirement is imposed in the “exception area,” the downtown business district. There the minimum requirement is reduced to 1 space for each 1,000 sq ft. The city waives the requirement for property located adjacent to publicly owned parking lots.

The city also allows developers to provide up to 75 percent of required parking (in Zones C and M) at remote locations. In this case, shuttle or transit service must be provided between the lot and the destination; an annual report on the remote parking program must be filed with the city; and sufficient open space must be set aside to provide a parking structure to meet full requirements if the city finds it necessary. Another parking policy allows the parking requirement to be reduced by up to 40 percent for specific traffic mitigation programs. Again, sufficient open space must be set aside to meet full requirements if found necessary.

Within the area of Los Angeles regulated by the Community Redevelopment Agency (CRA), developers of projects exceeding 100,000 sq ft must provide no fewer than 25 and no more than 40 percent of code-required parking in peripheral locations. Shuttle service linking the project to the lot must be provided in peak periods and operate at least every 10 min.

The city has not yet initiated much preferential parking in the vicinity of downtown, but plans are under way to begin such programs.

Traffic Mitigation In addition to zoning code provisions aimed at reducing traffic in the central downtown, the city has adopted other traffic mitigation measures. The city rideshare ordinance requires that owners of work sites with more than 700 employees prepare and implement trip reduction plans. Plans must designate a transportation coordinator, list specific strategies that will be implemented to reduce solo driving, provide annual progress reports, and meet a goal of 1.75 average vehicle employee ridership (weekly employee population divided by weekly number of employee vehicles). Additionally, the CRA requires traffic mitigation strategies by agreement with developers in its area of jurisdiction.

Key Findings

The most significant finding from Los Angeles relates to peripheral parking. The CRA requirement for peripheral parking is too new to evaluate, but the city peripheral program has not succeeded. No developers have opted to provide off-site parking as allowed by code. Developers are discouraged by the possibility that additional on-site parking may be required by the city at a future date depending on the effect of the peripheral parking.

Similar problems beset the provision allowing reductions in parking for traffic mitigation measures. First, city requirements are considered minimal, so there is little incentive to reduce them for any reason. Second, developers do not like the possibility of providing more on-site parking if mitigation measures fail.

The city rideshare ordinance has been rescinded because the South Coast Air Quality Management District now requires all employers in the region to implement trip reduction plans. The effects of the ordinance were not evaluated, although city staff indicate that 45 plans were submitted to the city under the ordinance—some “very good but many very poor.” CRA staff indicate that some of their longest-standing traffic mitigation agreements are not monitored well enough for their effects to be known. The staff believes the mitigation at City Corp Plaza is working well but could not provide specific evidence.

Overall, about 60 percent of employees drive alone to the downtown, 25 percent arrive by transit, and the balance arrive by carpool and other means.

Denver, Colorado

Background Information

Population Downtown employment is about 118,000; resident population is 491,000; SMSA population is about 1.6 million.

Parking Supply There are 71,000 spaces in the greater downtown area (153 blocks) and 37,000 in the core area (46 blocks). There are only 2,100 publicly owned off-street spaces; the great bulk of parking is privately owned and operated and open to the public.

Parking Rates Public off-street rates range from \$60.00 to \$80.00 per month; the daily off-street rate is \$0.50 per half-hour. On-street meters range from \$0.20 to \$1.00 per hour. Private rates are somewhat above public rates. Early bird rates are offered in many facilities.

Parking and Traffic Mitigation Policies

Parking Policy Denver does not use parking policy as an explicit means for reducing solo driving or increasing transit use. Although the city offers price breaks for car and vanpools in certain city facilities, parking requirements are not set to encourage transit or ridesharing. Requirements for office development in the city are 2 spaces per 1,000 sq ft except in the downtown (Zone B-5), where there is no requirement, maximum or minimum.

In the downtown, parking policy encourages provision of parking, and at least one public parking policy encourages long-term parking. Concerned that developers were not providing enough parking in the downtown (0.5 space per 1,000 sq ft is not uncommon), the city adopted a “premium” policy in 1981. The policy provides developers an extra 500 sq ft of development for each parking space provided beyond 70 percent of what is required for the particular use outside the

downtown (2 per 1,000 for office). Parking rates at publicly owned facilities lean toward catering to the long-term parker, as evidenced by some early bird specials (discount rates for parkers arriving before an early hour).

Another policy allows for the provision of peripheral parking. Part or all of required parking may be located off-site abutting the development or in the same zoning district, provided the developer can show a plan to ensure that the lot is devoted to parkers in the development. No shuttle service is required. Transit service may suffice as the connector, or a lot within acceptable walking distance may be approved.

In 1985 the city and regional transit set up a park-and-ride at Mile High Stadium, about 1 mile from the downtown. Shuttles ran every 20 min in the peak. Fares were \$0.25, compared with \$0.75 elsewhere.

The city has only two preferential parking zones. One is to protect neighborhoods from spillover parking around Mile High Stadium.

Traffic Mitigation Denver does not generally require buildings to have traffic mitigation strategies. No mitigation ordinance is envisioned. Occasionally, a planned unit development is allowed with reduced parking requirements on the basis of proximity to transit. A variances hearing is required. Very few such agreements are in place. Because Denver is suffering from high office vacancy (25 percent reported) and a slumping energy-dependent economy, city and transit district staff expressed more concern with stimulating economic activity than with mitigating traffic.

A voluntary program to reduce driving during times of poor air quality has been in place for 3 yr. The Better Air Campaign operated by the state Health Department is credited with reducing daily traffic by 3 to 5 percent in the region. Drivers are asked not to drive on certain days depending on their license plate number.

Key Findings

With the exception of a voluntary regional program aimed at better air quality, Denver policy has not been strongly directed at reducing automobile use. Mitigation policies have been limited to occasional agreements for reduced parking based primarily on proximity to transit. Parking policy is not aimed at reducing automobile use, although the absence of any minimum requirement in the downtown has tended to limit supply there. In some cases, developers provide as little as 0.25 space per 1,000 sq ft.

Even with this relatively tight supply of parking, transit ridership to the greater downtown is only a 13 percent share, with automobile drivers and passengers making up 87 percent, according to 1985 data. However, transit ridership to the core is about 28 percent of work trips, although this share may be declining according to transit officials.

Trends in transit ridership are attributed more to service levels and the state of the economy than to parking or mitigation policy. The city has implemented a transit mall in the downtown (no cars allowed on 16th Street except for cross traffic) with frequent shuttle service back and forth to transfer terminals at the ends of the mall. The terminals are destinations for express buses arriving and departing from outlying areas.

The Denver experience with peripheral parking has been mixed. Several developers have opted to provide off-site parking as allowed by code but have made no connections to their projects nor managed the lots to ensure that only project employees park there. City staff find it difficult to monitor and enforce the peripheral parking agreements. The park-and-ride at Mile High Stadium worked for a year or two but then was terminated. About 150 vehicles used the lot until the economy in Denver slumped and parking rates were lowered in downtown. Use of the lot declined, and shuttle service was halted. Today, only a few drivers park at the lot and ride regular, fixed-route service nearby. Transit planners say the park-and-ride may start again but only if and when the economy improves.

Hartford, Connecticut

Background Information

Population Downtown employment is about 90,000.

Parking Supply There are 21,000 spaces, with 2,700 publicly owned off-street; the balance is privately owned and operated, with about 10,000 spaces open to the public and the rest devoted to employees and patrons of businesses.

Parking Rates Private rates in garages range from \$120.00 to \$180.00 per month; in lots the range is \$50.00 to \$75.00 per month. Short-term rates are \$1.60 per half-hour in some areas. Public rates escalate by duration to discourage long-term parking, beginning at \$0.25 per half-hour. Meter rates are generally \$0.25 per half-hour.

Parking and Traffic Mitigation Policies

Parking Policy Several policies in Hartford aim at encouraging transit, ridesharing, and traffic mitigation. The office parking requirement downtown is 1 space per 1,000 sq ft. Parking requirements can be reduced by up to 30 percent for discounted carpool parking, rideshare promotions, subsidized transit passes, and 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 is to encourage off-site parking, shuttle service, transit, and ridesharing. At its own parking facilities, the city maximizes short-term parking and minimizes long-term parking.

Traffic Mitigation All developments in two downtown zones (B-1 and B-2) must prepare a Transportation Management Plan. TMP requirements encourage strategies for promoting ridesharing and transit and provision of off-site parking. Through negotiations on the plan, the city and developers agree to specific traffic mitigation strategies that are then secured by developer agreement. The state Transportation Commission also plays a role in mitigation. It requires special permits for downtown projects that will have an impact on state highways. The permit may require strategies to encour-

age transit and ridesharing or financial contributions in support of same. Finally, the Rideshare Company (a transportation management organization comprised of 14 large employers) promotes ridesharing downtown, encourages transit, and promotes policies supportive of ridesharing and transit—for example, reduction of employer parking subsidies for downtown employees.

The city has developed one fringe parking facility as part of mitigation efforts and plans now to start another operated by the state as a park-and-ride for state employees.

Key Findings

The Hartford incentive for reduced parking requirements has not been used. In particular, there have been no requests for reduced parking requirements since 1984 when reductions were offered for rideshare and transit encouragements. It seems that developers and lenders believe that parking is very short in Hartford and want to provide more than the minimum required. Thus, the possible relaxation in requirements is not a meaningful incentive.

City encouragements for developer provision of peripheral parking and shuttle systems also have not yet worked. City planners hoped that developers would provide peripheral parking and shuttles as a result of requirements for underground parking and development of TMPs. Instead, developers lease nearby surface parking where available and provide it to tenants. City planners hope that developers will provide peripheral lots and shuttles as new development takes away surface parking in the downtown. The one city-initiated peripheral lot (located at a sports facility to the north) has not attracted much use. Secure parking and shuttle service are offered at a cost of \$50.00 per month. Much downtown commercial surface parking costs about the same rate, so the peripheral lot is not attractive.

Certain traffic mitigation policies are meeting with more success. The Rideshare Company claims success in reducing drive-alone commute trips by 12 to 15 percent at 16 companies it targets for services. The result is attributed to intensive, personalized rideshare services, including good support from company managers and fast carpooling matching. The company also indicates success in encouraging flextime to spread the traffic peak. The company has been working for 5 yr to reduce employer subsidies of employee parking. Estimates are that 70 percent of Hartford employees receive subsidies. So far, no employers have removed the subsidy. In spite of some successes, Rideshare Company estimates that solo driving shares are up by 7 or 8 percent over the past 5 yr, with transit ridership down by the same percent and overall ridesharing up just a couple of percent. Transit ridership share in Hartford was 20 percent in 1988; rideshare, 22 percent; and solo share, 55 percent. Finally, the effects of state-imposed mitigations are not yet known. The state has required street improvements and contributions to the state-operated transit system serving the city.

REVIEW OF PERIPHERAL PARKING LITERATURE

The review of parking and traffic mitigation policies in six cities reveals considerable interest in peripheral parking as

one way to reduce downtown traffic and as an alternative to providing parking on valuable if not scarce downtown land. Peripheral parking is defined as parking within a mile or two of downtown, as contrasted with remote park-and-ride systems located many miles from downtown. A portion of the park-and-ride literature is devoted to peripheral parking. The literature provides some lessons about the effectiveness and operations of peripheral lots.

Effectiveness

The park-and-ride literature suggests cautions about peripheral lots. One careful study of park-and-ride systems in Seattle (4) suggested that lots located farther from downtown are generally more effective than those located closer to the CBD. Some close-in lots showed good use but drew a high proportion of their users away from local transit routes. The lots that attracted the highest proportions of people who previously drove alone were those more than 10 miles out in areas without previous transit service. The same result was found in a study of park-and-ride lots in Baltimore (5).

This is not to say that fringe parking cannot work, especially where coordinated with other policies. For several years, St. Paul operated a successful system of park-and-ride lots on the periphery of downtown. Low parking rates of \$1.00 per day or \$20.00 per month and frequent shuttle service (every 5 min) attracted good use of the lots (6). More recently, the city has abandoned the shuttle service because of growing expense. The system has been replaced by a program of low-fare public transit in a downtown zone (\$0.10 compared with \$0.75), dubbed the "dime zone," combined with inexpensive daily parking at the Civic Center garage (1,600 spaces) on the edge of the dime zone. According to city staff, many commuters drive to the Civic Center and other commercial parking facilities at the edge of the dime zone and ride transit to work. Parking in the downtown averages \$50.00 per month and \$4.00 per day, whereas Civic Center rates are about half these rates. No formal evaluation has been done of fringe parking demand, but the city believes the demand is considerable. Overall transit share for employees is about 38 percent into the downtown.

Operations

Park-and-ride facilities must be carefully planned and operated to succeed. The literature suggests conducting careful market research before initiating any park-and-ride lots. Research should include surveying commuters and employees regarding possible interest in park-and-ride, presuming certain bus frequencies, routes, fares, and parking fees, if any. The literature suggests there is no uniform way to estimate demand (7) but advises a combination of employee surveys and data analysis focused especially on the number of commuters passing near the proposed facility and their current mode shares. This work will define the probable market area and the maximum number of candidate drivers and transit users who might use the facility.

The literature suggests certain operational and design guidance. The facility must be visible and well marked. Transit must have access to the site. Walking distances within the lot to transit must not be more than 600 to 1,000 ft. Transit frequency should be no more than 5 to 10 min. Practical limits

on overall size will be determined by the site, but experience suggests a maximum of 1,000 to 1,500 spaces per transit terminal. A daily demand of 250 is suggested as the minimum necessary to justify park-and-ride service. The literature also suggests using joint use lots (sports centers, churches, shopping centers), especially where there is uncertainty about demand or where low demand is probable. The literature offers other guidance regarding shelters for waiting, telephones, trash receptacles, security, liability, and lighting.

IMPLICATIONS FOR LOCALITIES

Parking Policy

The case studies and literature have several implications regarding parking policies. Certainly one lesson is that cities have a difficult time setting parking requirements in support of policy objectives. For example, Portland's maximum is set sufficiently high that many developers provide less than the maximum. Several cities have provided for optional relaxations in parking requirements for various purposes (support of peripheral parking, ridesharing and transit encouragements, in-lieu funds) only to find developers not taking advantage of relaxations. Los Angeles, Hartford, and Seattle all provide examples.

The difficulties of setting maximums, minimums, or relaxations to serve public purposes are understandable. Determining what developers and lenders prefer to provide in the way of parking supply and setting requirement policy accordingly are not simple tasks. Even if planners are able to determine the market demand and supply levels at any one time and place, the demand-supply equation is constantly varying because of everything from the state of the economy to the price of gasoline to the level of transit service. Policy implications for localities follow.

Local governments are best advised to be cautious with maximums, minimums, and flexible requirements. Cities and counties need to be especially careful in designing minimum requirements with relaxations in support of in-lieu funds or ridesharing and transit. It is very possible that such an approach will not be as attractive to developers as intended.

If support of ridesharing or transit is desired, it should be required directly rather than tied to optional reductions in requirements.

Likewise, any plans for fringe parking probably should not be tied to in-lieu financing, as anticipated funding may not develop.

Maximum or minimum requirements, if desired, should be set only after careful assessment of what developers and lenders perceive as the parking market. Even then, these limits may well miss the mark in some areas—if not immediately, then in the future—with changes in development, transit, and driving trends. It is probable that some developers will provide much less than the maximum or much more than the minimum, thereby raising questions about the rationale for the policies.

Another clear lesson from the case studies is that parking rate regulation also should be approached with caution. Not only is there virtually no experience with the strategy but in the one case where it is in effect (San Francisco), developers are finding ways to subvert the regulation. Perhaps in time San Francisco will find the formula that has the desired effect.

At this stage, the experience with rate regulation is simply too limited and problematic for localities to implement rate regulation.

Finally, it appears that employer subsidies of employee parking may be widespread, at least in some cities (Hartford). If so, this phenomenon will blunt the effects of any parking pricing policies aimed at raising rates and discouraging solo driving. Such policies include parking taxes, rate regulation, and requirements for priced permits in certain zones. Thus, if localities wish to analyze pricing options, the first step should be to assess the prevalence of employer parking subsidies.

Transit Use and Parking Policy

The case studies reveal an important lesson about transit use. In all the cities surveyed, transit use appears to be falling irrespective of parking policy. Transit use is falling where the most stringent policies are in effect (Portland, Seattle, San Francisco), as well as where little parking policy is in effect (Denver). Very probably the effect is due to such variables as declining gasoline prices or transit service or both. Although the declines are modest, they point up the fact that even the most aggressive parking policy cannot always boost transit ridership, especially in the face of counteracting variables.

Another conclusion is that limited and costly parking certainly appears to be associated with the highest transit shares. San Francisco, with the most expensive and least available parking downtown compared with the number of employees, shows the highest transit share (60 percent). Portland and Seattle come in next (43 percent and 45 percent, respectively), as do their average parking prices and relatively tight supplies. Denver is next (28 percent), with few stringent parking policies but a relatively tight supply provided by the market. The anomaly is Hartford, with tight and expensive parking but a relatively low transit share (20 percent). Perhaps the result can be explained by the relatively high rideshare rate in Hartford, 22 percent.

Policy implications for localities follow.

- Localities are advised to keep parking on the tight side compared with demand, presuming the goal of increased transit and ridesharing. Left on their own, local developers and lenders may prefer to provide limited parking, as in Denver. In such a case, local governments may decide not to intervene in the market. However, if the market provides ample parking, or if prices appear low, or if parking subsidies are common, then local governments may wish to intervene through maximum requirements or pricing policies.

- Given the experience of cities in regulating supply through code provisions, localities probably should proceed step by step and evaluate policies along the way. One approach to consider might be a maximum requirement in the immediate vicinity of transit corridors and major terminals. Again, the maximum must be set after careful market assessment and should periodically be reviewed.

Peripheral Parking

The case studies and literature suggest several lessons about peripheral or fringe parking. First, developers are not likely to develop fringe facilities and shuttle connections with only

encouragements and incentives to do so. Hartford, San Francisco, and Los Angeles have encouraged developers to develop fringe park-and-ride systems through various direct and indirect means. However, no fringe parking has yet developed. In Los Angeles, it appears that the code provision attaches too many burdensome requirements to attract developers. Yet in Hartford, the fringe parking provisions are not a burden, and still no fringe parking has developed. Developers prefer simply to lease nearby surface lots for employees who then walk a block or two to work. In all these locations, the cost of providing on-site parking is substantial. In light of this situation, it is no wonder that the CRA in Los Angeles is now requiring peripheral parking instead of making it an option. In short, developers are not inclined to provide fringe facilities under the usual optional provisions found in codes.

Second, even if fringe parking is implemented by one means or another, it may not work well. Denver developers have provided some off-site parking in response to city code provisions but have not located or managed the parking in a way to ensure that tenant employees use it. Off-site parking is sometimes used by parkers not related to the project. And lots often are not on transit routes and are not linked to the development by shuttle. City staff find it hard to enforce provisions requiring better management and linkages. The Denver Mile High Stadium park-and-ride was modestly successful for a short time but very susceptible to changes in the economy and parking rates downtown. In Hartford, the city-initiated test lot is not yet working well. Finally, the park-and-ride literature suggests that close-in lots may take away ridership from local transit service or may not work as well as remote lots. In any case, fringe facilities must be carefully planned and coordinated with transit. One success in St. Paul seems to result from not only reduced parking charges at the lot but also frequent and inexpensive transit service to downtown.

Policy implications for localities follow.

- Localities should not attempt to encourage fringe parking through incentives in the parking code, such as reduced parking requirements. The experience suggests that cities have a difficult time developing fringe facilities in this way, as well as regulating and enforcing their use.

- Localities may wish to test fringe parking at a few facilities, perhaps starting through joint use arrangements to minimize cost and allow for easy termination. If experience is any guide, use may be limited or short-lived and in any case will be highly dependent on parking prices and policies downtown. Any such test should involve frequent shuttle service, low or no fares, and design considerations suggested by the literature.

Traffic Mitigation

The case studies suggest some pointers. First, the success of traffic mitigation strategies is heavily dependent on variables other than the strategies themselves. The size and makeup of the employment force, the availability of parking, the proximity to transit, and other variables are important. Consequently, it is no surprise that cities have very mixed results when requiring specific mitigation strategies, such as designated carpool stalls or transit pass sales. Seattle experience underscores this point. Second, mitigation programs require

constant vigilance and enforcement complexities. The Seattle experience demonstrates the need to monitor developments for compliance with mitigation requirements constantly and the need to develop realistic sanctions (i.e., measures other than revoking occupancy permits). Monitoring preferential carpool treatments also is important. Clearly, staff and resources are needed to exert vigilance. Third, if mitigation plans are required from developers or employers, they too will require much review and interaction to ensure reasonable quality and follow-through, as suggested by the Los Angeles experience. Finally, voluntary and cooperative mitigation programs on the part of businesses and cities have brought some successes, as in Hartford, where ridesharing is up as a result of a concerted private sector effort. However, such efforts require strong commitment on the part of business leaders, good organization and staffing, and constant visibility. Policy implications for localities follow.

- Irrespective of what policy instrument localities use to encourage mitigation (ordinance, developer agreements, parking code provisions), cities and counties should not require many specific mitigation strategies, such as the set-aside of some proportion of parking for carpools. Instead, localities should require a designated coordinator, provision of transit and rideshare information to employees, and a plan that proposes strategies tailored to the site and types of employees at the site. Localities should be prepared to review and negotiate plans and develop staff accordingly.

- Local governments should investigate the potential of cooperative mitigation efforts with the private sector. The success of such efforts will be determined by the energy, commitment, resources and visibility given to the program.

- Localities should monitor the traffic mitigation plans and directions of the air quality management district for their areas and possible state legislation on air quality and mitigation. Evidence suggests that the role of regional and state actors and agencies in traffic mitigation and trip reduction is growing. In time, trip reduction may be preempted by other agencies.

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