CITY OF PASADENA

Traffic Reduction Strategies Study

Draft Report

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Executive Summary

For decades (indeed, perhaps since the invention of the motorcar) the citizens of Pasadena have complained to their elected officials that there is too much traffic. In the modern era, when most cities are seeing increasing numbers of cars on the road, is this proposition even feasible? And if such a goal can be achieved, can it be done without badly harming either the economy or residents' freedom of movement, or Pasadena's remarkable cultural attractions and quality of life?

Answering these two questions is the central goal of this report. To provide a strong focus, this study identifies a unified set of strategies that would result in at least a 25% reduction in the number of vehicle trips taken on Pasadena streets during the evening rush hour (i.e., the PM peak period). As a second, more modest alternative, a package of strategies that would result in at least a 10% reduction is also presented. The strategies are first identified and described, and then each is analyzed for both its potential effectiveness in reducing traffic in Pasadena, and its side effects: for example, the potential harm (or benefit) that a strategy may hold for the city's economy.

To help identify the best possible options for Pasadena, this study undertakes a wide-ranging review of traffic reduction techniques, examining not only those practiced currently in the United States, but also those adopted internationally. The many efforts that Pasadena is already making to give citizens better transportation choices -- investments in buses and light rail, better pedestrian safety, better cycling facilities, among other efforts -- are also reviewed. Finally, in addition to describing individual strategies, this report provides short case studies of a dozen cities -- both major cities and smaller suburban places, in both the United States and abroad -- that have made notable attempts to reduce traffic. This case study approach is well suited to showing how a group of strategies can work in concert (or fail to work) to reduce traffic congestion.

The entire proposition of reducing vehicle trips and traffic congestion is controversial. Anthony Downs, the noted Brookings Institution scholar and author of such gloomily titled works as *Still Stuck in Traffic*, declares that traffic congestion is "inevitable". Among economic development officials and developers, increasing motor vehicle traffic is often described as simply the price of success.

This study arrives at a different conclusion. Traffic congestion is not inevitable. If the citizens of Pasadena wish, it can be reduced: traffic congestion is a choice, not Pasadena's fate. Moreover, rising traffic congestion is not simply a byproduct or unavoidable symptom of economic success. Instead, traffic congestion is typically a sign of significant economic losses. It indicates a transportation system that is not economically efficient. As a result, reducing auto traffic can often result in substantial economic gains.

However, would Pasadena wish to make the significant changes, with all of the controversy that might be entailed, that would be required to significantly reduce traffic? This report cannot answer that question for the community. It does, however, provide a toolkit of strategies that are demonstrably successful in reducing traffic, and a window into communities where remarkable changes are taking place.

Our team's research arrived at two significant conclusions. First, numerous cities have demonstrated that traffic and drive alone rates can be significantly reduced. Second, when a

community wishes to do so, traffic can be reduced with remarkable rapidity. Consider the following case.

> *The central area of Sweden's capital, Stockholm, is approximately 13 square miles in size, or about half the size of Pasadena. In January of 2006, Stockholm began testing a new program aimed at reducing traffic. Six months into the trial, vehicle trips into and out of the area had fallen by 22%. Nearly 100,000 vehicle trips per day have been removed from the roads during peak business hours, yet downtown businesses have not suffered any revenue loss.*

Stockholm is not an isolated case. The sidebar on the following page briefly lists examples of cities, downtowns, districts and transit agencies that have succeeded in either: (a) significantly reducing vehicle traffic, or (b) significantly reducing drive alone rates. In some of these examples, such as London and Stockholm, existing traffic levels have been sharply reduced from the levels of a few years ago. In many of the other examples, rapid growth was offset by a major decline in the percentage of trips made by driving alone, so that the net result was little or no increase in traffic.

Since the goal of this report is to identify a way to reduce the *existing* number of vehicle trips on Pasadena streets during the evening rush hour by 25%, the examples which merely keep traffic levels constant while a city grows rapidly -- such as the addition of 250,000 workers to downtown San Francisco with no increase in traffic -- are not perfect precedents. However, they do provide important lessons about how a community can reduce driving.

Pasadena and the Region

With nearly 150,000 residents and its significant role as a regional center of employment, culture and nationally known attractions, Pasadena is a significant place. However, in a region as large and as multi-centered as Los Angeles, people's daily trips frequently begin in one city and end in another. As a result, the best strategies for decreasing trips must include partnerships with area cities, transit operators and other agencies—it is very difficult for one city to simply “go it alone”, since development activity and traffic does not respect city boundaries.

To help illustrate the situation, consider an extreme case. If all Pasadena residents and all Pasadena workers stopped driving entirely, Pasadena's city streets would not be free of cars. The existing pass-through traffic (with neither origin nor destination in Pasadena), amounting to about one third of all vehicle trips, would continue to pass through. Moreover, since the removal of all local trips would reduce delays for pass-through traffic, cutting through Pasadena on local streets would become more attractive, and it is likely that more pass-through traffic would be induced. How much would this "rebound effect" do to fill the roads back up again? The answer is difficult to determine, but the evidence suggests that at least some new pass-through trips would be induced.

Neighboring cities, regional agencies, the state and federal agencies all affect Pasadena, and to best reduce traffic, Pasadena will need to actively partner with all of them. However, Pasadena is not helpless. There is a great deal that the city can do on its own, using policy levers under its own control, to reduce car trips.

- *Arlington County, Virginia, Rosslyn-Ballston Corridor*: In the 1960s and 1970s, this suburban corridor consisted largely of tired strip malls with the ubiquitous free parking, a surrounding fabric of single-family homes, and sharply declining population and retail sales. Today, development in the corridor is booming, but with little growth in traffic. Traffic counts from 1997 to 2004, for example, show that while office and residential development grew by 17.5% and 21.5% respectively, traffic along the Rosslyn-Ballston corridor grew by only 2.3%. Census Journey-to-Work Survey data show that over 47% of corridor residents now take transit to work.

- *Bellevue, Washington:* In downtown Bellevue, Washington, the drive alone commute rate fell by 30% from 1990 to 2000, falling from 81% driving alone to 57%.

- *Boulder, Colorado:* Since 1995, the drive-alone rate for employees in downtown Boulder has fallen almost 36%, from 56% driving alone to 36%, while the transit mode share has more than doubled from 15% to 34%.

- *Cambridge, Massachusetts:* Cambridge's Travel Demand Management Ordinance requires that developers reduce the drive alone rate for their development to 10% below the average rate for the census tract in which their development sits. Although the ordinance applies only to new development and building expansions, by two years after the adoption of the ordinance, citywide drive alone rates had declined, even as the state of Massachusetts experienced increasing drive alone rates.

- *London, United Kingdom:* Since the beginning of 2003, when congestion pricing was introduced in central London, the number of vehicle trips in the congestion pricing zone has fallen by 17%. Congestion, measured in terms of person-hours of delay per mile traveled, has fallen by 26%.

- *Lloyd District, Portland, Oregon:* In the nine years since the baseline figures were measured (in 1997), the drive alone rate among all Lloyd District employees has fallen almost 29%, from 60% to 43%.

- *Portland, Oregon:* In 1975, the City of Portland set a cap of roughly 40,000 parking spaces downtown, later replaced with tight maximum parking requirements. City officials credit these limits with helping to increase downtown's transit mode split from about 20% in the early 1970s to 48% in the mid-1990s.

- *San Francisco:* Employment in downtown San Francisco doubled between 1968 and 1984, while the number of cars traveling into the downtown stayed the same.

- *Stockholm, Sweden:* Six months into the trial of congestion pricing the average traffic reduction across the control points between 6:30 AM and 6:29 PM is 22%.

- *Vancouver, Canada:* As a deliberate transportation strategy, Vancouver tremendously increased housing capacity in the downtown area to reduce commuting times and congestion, in what became known as the “living-first strategy”. From 1991 to 2002, the number of residents living downtown increased by 62%, to 76,000, but car trips into downtown remained essentially constant. In 1994, walking and cycling trips made up 20 percent of all daily trips into the downtown and together made up the third-highest used mode behind auto and transit trips: by 1999, walking and cycling trips made up 35 percent of all daily trips and are now the most frequently used mode.

Reconsidering Parking Policy in Pasadena

With the benefit of hindsight, we can reevaluate whether policy experiments that were undertaken beginning in the 1920s have worked out as intended. One area of Pasadena transportation history that has often been little noticed and little studied is parking policy. However, this study will argue that parking policy is perhaps the single most important lever within Pasadena's grasp for affecting the quantity of traffic on Pasadena city streets.

According to the zoning code, Pasadena's minimum parking requirements were adopted to "alleviate or prevent traffic congestion and shortages of curbside parking spaces". Has it worked? For half a century, virtually every city in southern California has had minimum parking requirements, and yet not only has traffic congestion gotten worse, it is projected to steadily worsen over the next 20 years.

Why was it believed that setting minimum parking requirements would alleviate traffic congestion? By the 1920s, the new problem of "spill-over parking" had already arrived in many downtowns. Automobiles filled up all of the curb parking in front of shops and apartments, and any nearby private parking, and then sometimes spilled over into nearby neighborhoods, crowding the streets there. In search of free parking near their destination, motorists often took to circling about, waiting for a space to open up. Instead of searching for parking, many motorists simply double-parked, clogging traffic lanes and greatly increasing congestion. Perhaps most importantly, well-known traffic engineers, such as Wilbur Smith, pointed out that if enough off-street parking were built to meet all possible demand, it would be much easier to prohibit on-street parking. The streets could then be filled from sidewalk to sidewalk with moving traffic.

The essential concept of minimum parking requirements was that if each destination provided ample parking, with enough spaces available so that even when parking was free there would be plenty of room, then there would be plenty of spaces at the curb. Motorists would no longer need to circle the block looking for a space, and so traffic congestion would be lessened.

Minimum parking requirements, however, had unintended consequences for traffic. Pasadena, like most California cities, set minimum parking requirements that were simply high enough to satisfy the demand for parking even when parking was given away for free. The predictable result was that most destinations wound up with free parking.

Dozens of studies have now demonstrated that when parking is given away free of charge, people drive more. The amount of extra driving induced is substantial. Figure 0-1 summarizes the results of studies of commuters in Los Angeles and elsewhere, showing the reduction in traffic that occurs when parking subsidies are removed or reduced. As this table shows, removing or reducing parking subsidies - subsidies that have been in good part created by minimum parking requirements - reduced vehicle trips by an average of 27%, in the mostly Southern California case studies shown here. Given Pasadena's goal for this study - figuring out how to reduce traffic by 25% - the role played by parking requirements cannot be overlooked.

Fortunately, Pasadena has more choices available to it than either: (a) accepting traffic congestion caused by cruising for free curb parking, or (b) imposing minimum parking requirements, which tends to lead to free parking everywhere and induces more driving.

In this report, a great deal of attention is paid to the political realities of reducing traffic. Any planner or elected official reading the preceding pages must have thought to themselves, "As an academic idea, reducing traffic by making people pay for parking sounds all well and good.

Figure 0-1 Employee Parking Pricing Effect on Auto Commute Rates

	Autos Driven per 100 Employees		
Case Study and Type	Employer Pays for Parking	Driver Pays for Parking	Decrease in Auto Trips
Mid Wilshire, Los Angeles (before/after)	48	30	-38%
Warner Center, Los Angeles (before/after)	92	64	-30%
Century City, Los Angeles (with/without)	94	80	-15%
Civic Center, Los Angeles (with/without)	78	50	-36%
Downtown Ottawa (before/after)	39	32	-18%
Average of Case Studies	70	51	-27%

Source: Willson, Richard W. and Donald C. Shoup. "Parking Subsidies and Travel Choices: Assessing the Evidence." Transportation, 1990, Vol. 17b, 141-157 (p145).

But who really wants to stand up in a public meeting, or planning commission hearing, or especially in an election campaign, and try to argue against the merits of ample free parking?" When we consider that for American employees, for example, free parking is by far the most common employee benefit, who would win elections by trying to take it away? The remainder of this study is filled with examples of places that have successfully reduced traffic. Sometimes, these places have leveled the playing field not by removing free parking, but by providing equally valuable subsidies to employees who don't drive. In other cases, neighborhoods and business districts have realized that the gains from ending free parking outweigh the pain of getting rid of it. They then built cities where one can live comfortably while walking, bicycling and taking transit. In each case, the place studied is part of a modern democracy, where planners and elected officials have to answer to voters. Pasadena voters may or may not wish to make the same choices. The point here is that if they wish to, there are options open, and there are real-world models to follow.

A Recommended Set of Strategies for Reducing Traffic by 25%

To reach a goal of reducing evening rush-hour traffic by 10%, or even 25%, not all of the twelve strategies recommended here would necessarily need to be implemented. Moreover, the strategies could be mixed and matched in several different ways in order to reach these goals. Since describing even just the most important variations would take many pages, for brevity's sake, each of the recommendations is generally presented here in a single basic form and at full strength.

While not all twelve of the strategies recommended here are required to achieve a 10% reduction (or even a 25% reduction) in existing vehicle trips during the evening peak hour, at least one of the strategies -- *congestion pricing* -- is almost certainly essential to achieve such an ambitious target. As described earlier in this paper, pass-through trips, with neither origin nor destination in Pasadena, account for a substantial share of peak hour trips on Pasadena city streets. If, through a variety of programs, Pasadena reduces local trips, this will reduce delays for pass-through traffic. Cutting through Pasadena on crosstown city streets will become more attractive, and it is very likely that therefore more pass-through traffic would be induced. To fully counteract this "rebound effect", congestion pricing is the only remedy known to be effective.

This does not mean that the other strategies recommended here cannot be helpful or should not be pursued. As described here and in the case studies of other cities, these strategies can strongly affect the number of auto trips generated by development within Pasadena, giving residents better alternatives to driving alone. For the most part, they are strategies that Pasadena can implement on its own: by contrast, congestion pricing cannot be implemented without a change in state law. The strategies are also likely to be a useful first step before any attempt to institute congestion pricing is made. Congestion pricing, several studies have suggested, is more likely to be accepted by the public when better alternatives to driving alone are provided: the other eleven strategies recommended in this chapter are designed to do that.

Where Are These Strategies Being Applied Already?

All of the transportation strategies recommended in this study have been implemented before. Nothing here is new or untested. In some cases, Pasadena already implements the strategy to some extent. Many of the recommendations are included as key steps because they appeared, over and over, as important strategies in cities that have succeeded in reducing vehicle trips. (Most of these strategies are rarely seen in communities where traffic is getting steadily worse.)

Figure 0-2 summarizes many of the strategies used in ten of the case study cities that were reviewed for this report. The table reviews 16 possible strategies. Where a strategy is checked off for a particular city, it indicates that the strategy is in widespread use in the area covered by the case study. For example, all of these cities have priced parking (both meters at the curb in commercial areas, and priced parking at many workplaces and other destinations), and all use residential parking permit districts to prevent spillover parking problems. Overall, even a quick scan of this table suggests one conclusion. Although some of these places are midsized and mostly suburban American cities, while others are European capitals, there is a notable consensus on overall direction: the removal of parking subsidies, combined with improvements to all other modes of transportation.

Twelve Recommendations

Recommendation 1: Charge the right price for curb parking

Charge the lowest price that will leave one or two vacant spaces on each block -- that is, performance-based pricing. This will eliminate the traffic congestion caused by drivers cruising for parking.

One source of excess traffic in Pasadena (as in many other cities) is cruising for parking, that is, people searching and circling to find a free or below market-rate curb parking space. Cruising for parking adds more traffic to an already congested street network. In these circumstances, managing parking prices to ensure that there are available curb parking spaces at all times of day is an important strategy for reducing traffic. Making sure that there are curb parking spaces available, using parking prices rather than relying on minimum off-street parking requirements, is also a fundamental first step that makes possible the implementation of many of the powerful traffic reduction strategies described later.

As demonstrated by the success of old Pasadena's parking meter zone, charging for on-street parking with a goal of leaving one or two vacant spaces on each block (i.e., a target occupancy rate of 85%) will not drive customers away. Under the policy, if rates are set too high, so that too many spaces are empty, the policy requires adjusting rates downward until the parking spaces are again well-used by customers.

Figure 0-2 Traffic Reduction Strategies in Ten Case Study Cities

Place	Parking Cash-Out Required	Congestion Pricing	Unbundling of Parking Costs Required	Universal Transit Pass Program	Parking Tax	Low Minimum Parking Requirements	Eliminated Minimum Parking Requirements	Set Maximum Parking Requirements	Priced Parking	Shared Parking/Park Once	Residential Parking Permit Districts	Carpool/Ride Matching Services	Car Sharing	Bicycle Parking Requirements	Rail Transit	Bus Rapid Transit
Arlington County, VA					✓	✓	✓		✓	✓	✓	✓	✓		✓	
Bellevue, WA (Downtown)			✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓		
Boulder, CO (Downtown)				✓		✓	✓		✓	✓	✓	✓	✓	✓		
Cambridge, MA						✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	
Lloyd District, Portland, OR				✓		✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	
London, Great Britain		✓					✓	✓	✓	✓	✓	✓	✓	✓	✓	
Portland, OR (Downtown)							✓	✓	✓	✓	✓		✓	✓	✓	
San Francisco, CA (Downtown)			✓		✓		✓	✓	✓	✓	✓	✓	✓	✓	✓	
Stockholm, Sweden		✓			✓	✓	✓	✓	✓	✓	✓		✓	✓	✓	✓
Vancouver, B.C.				✓	✓	✓		✓	✓	✓	✓	✓	✓	✓	✓	✓

Recommendation 2: Return the meter revenue to the neighborhoods that generate it

Revenue return will make performance-based prices for curb parking politically popular.

A. Create additional Commercial Parking Benefit Districts, modeled after the Old Pasadena Parking Meter Zone.

Net revenues from paid parking at the curb should fund public improvements that benefit the blocks where the money is collected.

If parking revenues seem to disappear into the General Fund, where they may appear to produce no direct benefit for the District where they are collected, there will often be little support for installing parking meters, or for raising rates when needed to maintain decent vacancy rates andprevent cruising traffic. But when District merchants and property owners can clearly see that the monies collected are being spent for the benefit of their blocks, on projects that they have chosen, they become willing to support market rate pricing.

B. Establish Residential Parking Benefit Districts.

Residential Parking Benefit Districts should be implemented in residential areas, wherever there is the potential for spillover parking from nearby commercial areas, and wherever densities are high enough that the on-street parking might fill up if left unmanaged. Residential Parking Benefit Districts are similar to Pasadena's existing residential parking permit districts, but can also allow a limited number of commuters to pay to use surplus on-street parking spaces in the residential areas, and then return the resulting revenues to the neighborhood to fund public improvements.

Recommendation 3: Invest a portion of parking revenues in transportation demand management programs

In Commercial Parking Benefit Districts, invest parking revenues in a full spectrum of transportation demand management strategies for employees and residents, including transit, carpool, vanpool, bicycle and pedestrian programs. Invest in the most cost-effective mix of transportation modes for access to the District, including both parking and transportation demand management strategies.

The cost to construct new parking garages in many parts of Pasadena can be expected to be approximately $30,000 per space gained, resulting in a total cost to build, operate and maintain new spaces of approximately $180 per month per space, every month for the expected 40 year lifetime of the typical garage. (Given land values, the opportunity cost of using surface land for parking can be even higher.) These dismal economics for parking garages lead to a simple principle: it can often be cheaper to reduce parking demand than to construct new parking.

Recommendation 4: Provide Universal Transit Passes

In recent years, growing numbers of transit agencies have teamed with universities, employers, or residential neighborhoods to provide universal transit passes. These passes typically provide unlimited rides on local or regional transit providers for low monthly fees, often absorbed entirely by the employer, school, or developers. The principle of employee and residential universal transit passes is similar to that of group insurance plans – transit agencies can offer deep bulk

discounts when selling passes to a large group, with universal enrollment, on the basis that not all those offered the pass will actually use them regularly. A review of existing programs found that the annual per employee fees are generally between 1% and 17% of the retail price for an equivalent annual transit pass. Universal transit passes are usually extremely effective means to reduce the number of car trips in an area, as shown in Figure 0-3.

Figure 0-3 Effects of Universal Transit Pass Introduction

Location	Drive to work		Transit to work	
Municipalities	Before	After	Before	After
Santa Clara (VTA)	76%	60%	11%	27%
Bellevue, Washington	81%	57%	13%	18%
Ann Arbor, Michigan	N/A	(4%)	20%	25%
Downtown Boulder, Colorado	56%	36%	15%	34%
Universities				
UCLA (faculty and staff)	46%	42%	8%	13%
Univ. of Washington, Seattle	33%	24%	21%	36%
Univ. of British Colombia	68%	57%	26%	38%
Univ. of Wisconsin, Milwaukee	54%	41%	12%	26%
Colorado Univ. Boulder (students)	43%	33%	4%	7%

Recommendation 5: Require the unbundling of parking costs

Parking costs are frequently subsumed into the sale or rental price of housing and commercial space in California, for the sake of simplicity and because that is the more traditional practice in real estate. But although the cost of parking is often hidden in this way, parking is never free, and hiding its cost results in higher vehicle ownership and more traffic. To reduce traffic, the full cost of parking should be "unbundled" from the cost of multifamily housing units (both rental and condominium); commercial space; and from the costs of other goods and services, with limited exceptions. For example, Bellevue, WA, “requires building owners to include parking costs as a separate line item in leases and to charge a minimum rate for monthly long-term parking that is equal or greater than the cost of a bus pass. This makes it easier for employers to determine the value of their current parking subsidies [when employers are establishing employee parking charges or parking cash-out programs].” Additionally, this policy means that employers who successfully reduce parking demand and traffic to their worksites are able to reap financial benefits by leasing fewer parking spaces. San Francisco provides an example of "unbundling" parking costs at residences: the city requires the unbundling of parking costs in all residential structures over ten dwelling units.

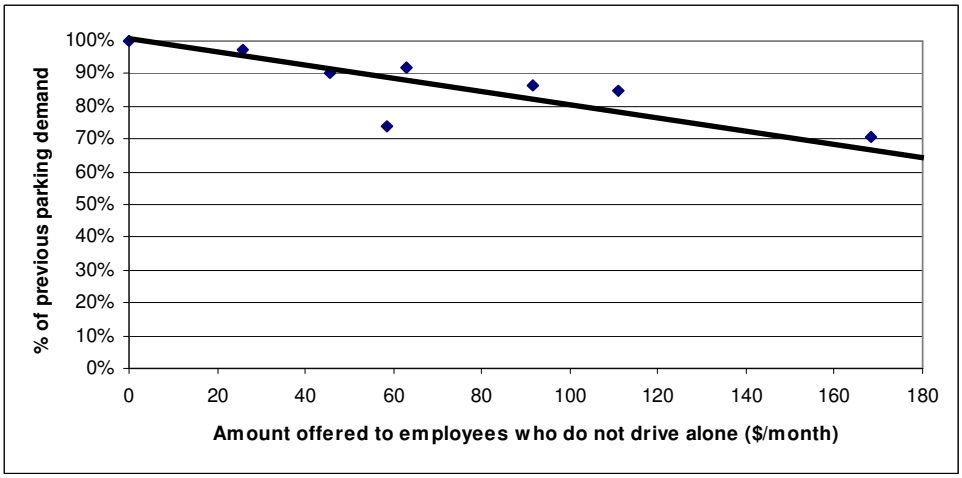
Recommendation 6: Require Parking Cash-Out

Require all new and existing employers that provide subsidized employee parking to offer their employees the option to "cash out" their parking subsidy.

The majority of all employers provide free or reduced price parking for their employees as a fringe benefit. Under a parking cash out requirement, employers are allowed to continue this practice *on the condition that they offer the cash value of the parking subsidy to any employee who does not drive to work*. The primary benefit of parking cash out programs is their proven effect on reducing auto congestion and parking demand. Figure 0-4 illustrates the effect of parking cash-out at seven different employers located in and around Los Angeles. It should be noted most of

the case study employers are located in areas that do not have good access to transit service, so that a large part of the reduced parking demand and driving to work that occurred with these parking cash out programs resulted when former solo drivers began carpooling.

Figure 0-4 Effects of Parking Cash-Out on Parking Demand



Effects of parking cash-out on parking demand. Source: Derived from Donald Shoup, "Evaluating the Effects of Parking Cash-Out: Eight Case Studies," 1997. Based on the cost in 2005 dollars.

Recommendation 7: Strengthen transportation demand management requirements

Strengthen Pasadena's existing transportation demand management requirements, programs and services, both by asking more of employers and by providing additional public resources and staff attention.

In many ways, this recommendation overlaps with previous recommendations, such as devoting a portion of parking meter revenues to transportation demand management programs, enrolling employees and residents in universal transit pass programs, unbundling parking costs, and so on. However, additional techniques that have not been mentioned so far can include:

Trip Reduction Ordinances: In two of the successful case study cities, Bellevue, WA and Cambridge, MA, strong trip reduction ordinances have had a significant impact on drive-alone rates. For example, Downtown Bellevue worksites enrolled in its Commuter Trip Reduction program reduced drive alone rates from 72.9% to 58.5% - a 20% decrease.

Supporting Car-Sharing: Car-sharing provides individuals with access to a fleet of shared vehicles, allowing them to avoid owning a car, or a second or third car. Pasadena can step up efforts to attract car-sharing through several mechanisms, such as requiring new developments to provide parking and subsidize start-up costs, or reducing or eliminating the City's fleet of pool cars, and allowing employees to use car-sharing instead.

Recommendation 8: Improve transit

To reduce traffic, further investments in transit are a key strategy. If the City of Pasadena employs the demand management techniques recommended elsewhere, such as Universal

Transit Passes, parking cash out programs and/or congestion pricing, people will have greater need for - and there will be riders for - an excellent transit network that can better compete with driving. Both London's and Stockholm's congestion charging schemes are heavily supported by investments in transit. Transit service can be expanded and improved in several ways, for instance by improving:

- Frequency
- Reliability
- Travel time
- Hours of operation
- Service and comfort

Comprehensive improvements, such as Light Rail or Bus Rapid Transit systems, can provide large increases in transit use and attract large numbers of discretionary riders who would otherwise travel by automobile. Various cities have seen increases in bus ridership with the introduction of BRT service – Pittsburgh (38%), Los Angeles (40%), Brisbane (42%), Adelaide (76%), Leeds (50%).

Recommendation 9: Improve bicycle and pedestrian facilities and programs

Although bicycling and walking rates in Pasadena are still modest, compared to some California college towns, such as Davis, Palo Alto and Berkeley, Pasadena residents already bike and walk to work at rates double the national average. Recently, Pasadena expanded the bikeway network with 50 miles of additional bike lanes, enhanced bike routes, and standard bike routes. The Mobility Element describes many further potential improvements, as do Pasadena's Bicycle and Pedestrian Master Plans. Many of the other recommendations in this chapter will both increase demand for bicycling and walking facilities and will have greater effect if excellent facilities to welcome new cyclists and pedestrians are in place. These plans should be fully implemented.

Recommendation 10: Remove minimum parking requirements for off-street parking

All minimum parking requirements in Pasadena should be removed.

Pasadena's minimum parking requirements were adopted to "alleviate or prevent traffic congestion and shortages of curbside parking spaces". In many parts of Pasadena, minimum parking requirements have succeeded in preventing shortages of curbside parking spaces, but they have played a powerful role in increasing the number of vehicle trips on Pasadena streets and worsening traffic congestion throughout the City.

Minimum parking requirements worsen traffic congestion through a simple three step process:

1. Minimum parking requirements are set high enough to provide more than enough parking even when parking is free, even at isolated suburban locations with little or no transit.
2. Parking is then provided for free at most destinations, and its costs hidden.
3. Bundling the cost of parking into higher prices for everything else skews travel choices toward cars and away from public transit, cycling and walking.

Once the first two recommendations in this report - setting prices for curb parking that ensure at least one or two vacancies per block, and returning the resulting parking revenue to the neighborhood where it is generated - are fully implemented, off-street minimum parking requirements are no longer needed to prevent shortages of on-street parking. Instead, they only act to worsen traffic, and to discourage developers, employers, residents and other property owners from implementing strategies that reduce traffic and parking demand.

Recommendation 11: Set maximum parking requirements

To reduce vehicle trips and congestion, set maximum parking requirements for Pasadena districts that limit the supply of parking to available road capacity.

As described earlier, most of the case study cities - at least eight out of ten - employ *maximum* parking requirements, rather than minimum parking requirements, to successfully reduce traffic congestion. Pasadena also now employs maximum parking requirements in its transit oriented development zones. Maximum parking requirements generally alleviate traffic congestion and reduce auto use through a simple three step process:

1. Maximum parking requirements are set low enough to so that if parking at a location is given away for free, there will be a shortage.
2. Parking at these locations is then provided to the people who use it for a price that covers at least part of its costs, so that parking's cost is revealed. Alternately, employers and other parking providers need to provide strong subsidies for alternative transportation (such as free transit passes or a parking cash out program), to avoid a shortage while remaining popular with their drivers.
3. Removing parking subsidies (or providing equally strong subsidies for other modes) then brings travel choices back into balance, toward public transit, cycling and walking.

As with removing minimum parking requirements, the first two recommendations in this chapter - setting prices for curb parking that ensure at least one or two vacancies per block, and returning the resulting parking revenue to the neighborhood where it is generated - need to be implemented, in order to prevent shortages of on-street parking when maximum parking requirements are set.

Recommendation 12: Establish congestion pricing

As is described at length in the case studies, establishing congestion pricing is the most powerful single technique for ensuring traffic reduction. For pass-through trips (that is, trips with neither origin nor destination in Pasadena) on Pasadena streets, it is almost certainly the only truly effective remedy, the only one that can guarantee a decline in this type of trips. Two of the case studies demonstrate the efficacy of congestion pricing:

London: Congestion delays dropped 26% since 2003 from 2.3 to 1.8 minutes per kilometer. Figures from 2005 show a 17% decrease in total traffic with a 31% drop in potentially-chargeable vehicles entering the zone. From 2002 to 2005, the total number of car "vehicle-kilometers driven" fell 39%. The fee is not considered to be a perfect solution due to it not being time or location-variable.

Stockholm: Average traffic reduction across the control points between 6:30 AM and 6:29 PM is 22%. The reduction reached its peak during afternoon rush hours with a 24% drop. Traffic

reduction in the inner city shows a 15% drop in vehicle kilometers traveled. Vehicle travel times dropped significantly within and around the inner city. The largest reductions were observed around the control points, where time spent in congestion was reduced by a third in the morning peak hour and by half in the evening peak hour. No adverse traffic impacts on surrounding road network.

However, the State of California has already adopted legislation under the Vehicle Code prohibiting fees for use of public roads. This means that for a Congestion Pricing Charge to be levied in Pasadena, state legislation would be required to authorize the formation of a public agency to levy the charge.

Conclusions

While congestion pricing, based upon its success around the world (including on various American high occupancy toll lanes, such as I-15 in San Diego County) is a powerful tool, and clearly has the capacity to reach this study's goal of reducing traffic on Pasadena streets during the evening peak hour by 25%, it is a measure that Pasadena clearly cannot implement without approval from the state legislature. For this reason, it has been left for last on this list of recommendations. However, it is worth noting that as technical obstacles have fallen, and an increasing number of congestion pricing programs have met with voter approval, congestion pricing is growing in popularity.

If implementing congestion pricing appears a long way down the road, however, or is not desired by the community, the reader should not feel that little can be done. The recommendations previously presented are highly effective. Numerous researchers have compared the benefits produced by reducing parking subsidies, for example, to the effects of charging congestion tolls. In 1967, J. Michael Thomson estimated that parking fees in central London could produce about half the benefits of a peak-period congestion toll for all cars entering central London. In California, Professor Elizabeth Deakin and Greig Harvey estimated that the right level of tolls for congested roads in Los Angeles in 1991 would average about $0.10 per mile. UCLA's Professor Shoup calculates that free parking at work reduces the cost of commuting by $0.22 a mile, meaning that if Pasadena had to choose either eliminating parking subsidies or congestion pricing, removing the parking subsidies would yield higher benefits.

Perhaps most importantly, many of the recommendations previously cited involve delivering benefits: new transportation benefits for commuters, such as free transit passes; new parking revenues for merchants to spend on public improvements, such as the new streetscapes in Old Pasadena; and new options for residents, such as the option to determine how many or how few parking spaces one wishes to purchase or lease. All of these recommended traffic reduction strategies, it is worth remembering, have been implemented in modern democracies, in places where elected officials and city planners need the approval of the community, and were able to win it.

The purpose of this study, we should note, is not to decide whether Pasadena citizens wish to take action to reduce traffic. It does, however, provide a clear roadmap, based upon measures that have been proven and implemented, to show how traffic may be reduced if the community wishes to do so.

Chapter 1. Introduction

For decades (indeed, perhaps since the invention of the motorcar) the citizens of Pasadena have complained to their elected officials that there is too much traffic: too much traffic roaring down their neighborhood streets, too many cars fouling the water and the air, or too many cars waiting in line – that is, ahead of the complainer's own car -- at the traffic light. When Pasadena residents do head out on foot or bike, or hop the bus, many wish there were fewer cars clogging the streets and enough space left for comfortable bike lanes and generous sidewalks. Whatever the specific reason for complaining about traffic, whether it is noise or pollution or danger to pedestrians, or the tiresome daily annoyance of sitting in traffic congestion, many citizens would like something done. They would like less traffic.

In the modern era, when most cities are seeing increasing numbers of cars on the road, is this proposition even feasible? And if such a goal can be achieved, can it be done without badly harming either the economy or residents' freedom of movement, or Pasadena's remarkable cultural attractions and quality of life?

Answering these two questions is the central goal of this report. To provide a strong focus, this study identifies a unified set of strategies that would result in at least a 25% reduction in the number of vehicle trips taken on Pasadena streets during the evening rush hour (i.e., the PM peak period). As a second, more modest alternative, a package of strategies that would result in at least a 10% reduction is also presented. The strategies are first identified and described, and then each is analyzed for both its potential effectiveness in reducing traffic in Pasadena, and its side effects: for example, the potential harm (or benefit) that a strategy may hold for the city's economy.

To help identify the best possible options for Pasadena, this study undertakes a wide-ranging review of traffic reduction techniques, examining not only those practiced currently in the United States, but also those adopted internationally. For easy reference, these strategies are presented in a series of individual strategy sheets, which provide a brief summary of evidence on the effectiveness of the strategy, examples of communities that have implemented it, and a discussion of potential side effects.

The many efforts that Pasadena is already making to give citizens better transportation choices -- investments in buses and light rail, better pedestrian safety, better cycling facilities, among other efforts -- are also reviewed. Despite the perception that in Los Angeles, everyone drives to work, many Pasadena residents and workers already use alternatives to driving. Pasadena residents and workers are less likely than the average American to drive to work, and less likely to own a car.[1] While the myth may hold that in California, every household has at least two cars (and maybe five or ten), the reality in Pasadena is that most households have one car or no car. Pasadena is already, more than most American cities, working to create a community where driving one's car is an option, rather than an absolute necessity. This report helps establish where Pasadena's efforts are already working well, where they can be improved and what more Pasadena could do -- if the community wishes -- to create better alternatives to driving.

Finally, in addition to describing individual strategies, this report provides short case studies of a dozen cities -- both major cities and smaller suburban places, in both the United States and

[1] The Existing Conditions Analysis Appendix documents current travel behavior in Pasadena, along with other information on existing transportation conditions.

abroad -- that have made notable attempts to reduce traffic. This case study approach is well suited to showing how a group of strategies can work in concert (or fail to work) to reduce traffic congestion.

The entire proposition of reducing vehicle trips and traffic congestion is controversial. Anthony Downs, the noted Brookings Institution scholar and author of such gloomily titled works as *Still Stuck in Traffic*, declares that traffic congestion is "inevitable". Among economic development officials and developers, increasing motor vehicle traffic is often described as simply the price of success.

This study arrives at a different conclusion. Traffic congestion is not inevitable. If the citizens of Pasadena wish, it can be reduced: traffic congestion is a choice, not Pasadena's fate. Moreover, rising traffic congestion is not simply a byproduct or unavoidable symptom of economic success. Instead, traffic congestion is typically a sign of significant economic losses. It indicates a transportation system that is not economically efficient. As a result, reducing auto traffic can often result in substantial economic gains.

However, would Pasadena wish to make the significant changes, with all of the controversy that might be entailed, that would be required to significantly reduce traffic? This report cannot answer that question for the community. It does, however, provide a toolkit of strategies that are demonstrably successful in reducing traffic, and a window into communities where remarkable changes are taking place.

Our team's research arrived at two significant conclusions. First, numerous cities have demonstrated that traffic and drive alone rates can be significantly reduced. Second, when a community wishes to do so, traffic can be reduced with remarkable rapidity. Consider the following case.

> *The central area of Sweden's capital, Stockholm, is approximately 13 square miles in size, or about half the size of Pasadena. In January of this year, Stockholm began testing a new program aimed at reducing traffic. Six months into the trial, vehicle trips into and out of the area had fallen by 22%. Nearly 100,000 vehicle trips per day have been removed from the roads during peak business hours, yet downtown businesses have not suffered any revenue loss.*

Stockholm is not an isolated case. The sidebar on the following page briefly lists examples of cities, downtowns, districts and transit agencies that have succeeded in either: (a) significantly reducing vehicle traffic, or (b) significantly reducing drive alone rates. In some of these examples, such as London and Stockholm, existing traffic levels have been sharply reduced from the levels of a few years ago. In many of the other examples, rapid growth was offset by a major decline in the percentage of trips made by driving alone, so that the net result was little or no increase in traffic.

Since the goal of this report is to identify a way to reduce the *existing* number of vehicle trips on Pasadena streets during the evening rush hour by 25%, the examples which merely keep traffic levels constant while a city grows rapidly -- such as the addition of 250,000 workers to downtown San Francisco with no increase in traffic -- are not perfect precedents. However, they do provide important lessons about how a community can reduce driving. In the following pages, this report attempts to succinctly describe how the traffic reduction results seen in the case studies were achieved, and to identify the many common elements in these places' approaches. We also describe some of the significant costs, benefits and trade-offs of reducing traffic.

- *Arlington County, Virginia, Rosslyn-Ballston Corridor*: In the 1960s and 1970s, this suburban corridor consisted largely of tired strip malls with the ubiquitous free parking, a surrounding fabric of single-family homes, and sharply declining population and retail sales. Today, devel in opment in the corridor is booming, but with little growth in traffic. Traffic counts from 1997 to 2004, for example, show that while office and residential development grew by 17.5% and 21.5% respectively, traffic along the Rosslyn-Ballston corridor grew by only 2.3%. Census Journey-to-Work Survey data show that over 47% of corridor residents now take transit to work.

- *Bellevue, Washington:* In downtown Bellevue, Washington, the drive alone commute rate fell by 30% from 1990 to 2000, falling from 81% driving alone to 57%.

- *Boulder, Colorado:* Since 1995, the drive-alone rate for employees in downtown Boulder has fallen almost 36%, from 56% driving alone to 36%, while the transit mode share has more than doubled from 15% to 34%.

- *Cambridge, Massachusetts:* Cambridge's Travel Demand Management Ordinance requires that developers reduce the drive alone rate for their development to 10% below the average rate for the census tract in which their development sits. Although the ordinance applies only to new development and building expansions, by two years after the adoption of the ordinance, citywide drive alone rates had declined, even as the state of Massachusetts experienced increasing drive alone rates.

- *London, United Kingdom:* Since the beginning of 2003, when congestion pricing was introduced in central London, the number of vehicle trips in the congestion pricing zone has fallen by 17%. Congestion, measured in terms of person-hours of delay per mile traveled, has fallen by 26%.

- *Lloyd District, Portland, Oregon:* In the nine years since the baseline figures were measured (in 1997), the drive alone rate among all Lloyd District employees has fallen almost 29%, from 60% to 43%.

- *Portland, Oregon:* In 1975, the City of Portland set a cap of roughly 40,000 parking spaces downtown, later replaced with tight maximum parking requirements. City officials credit these limits with helping to increase downtown's transit mode split from about 20% in the early 1970s to 48% in the mid-1990s.

- *San Francisco:* Employment in downtown San Francisco doubled between 1968 and 1984, while the number of cars traveling into the downtown stayed the same.

- *Stockholm, Sweden:* Six months into the trial of congestion pricing the average traffic reduction across the control points between 6:30 AM and 6:29 PM is 22%.

- *Vancouver, Canada:* As a deliberate transportation strategy, Vancouver tremendously increased housing capacity in the downtown area to reduce commuting times and congestion, in what became known as the “living-first strategy”. From 1991 to 2002, the number of residents living downtown increased by 62%, to 76,000, but car trips into downtown remained essentially constant. *. In 1994, walking and cycling trips made up 20 percent of all daily trips into the downtown and together made up the third-highest used mode behind auto and transit trips: by 1999, walking and cycling trips made up 35 percent of all daily trips and are now the most frequently used mode.*

Traffic Reduction, While Meeting Other Community Goals

All of the case studies presented in this report have an additional important similarity with Pasadena: a strong and growing economy. One can easily list examples of cities where traffic reduction has occurred simply because the community has a declining economy and falling population: any number of Rust Belt cities could be cited. However, since a clear and important goal of Pasadena is to foster economic prosperity, studying cities in decline seems irrelevant. Instead, all of the case studies here show how it is possible to grow an economy, while becoming less dependent on the automobile.

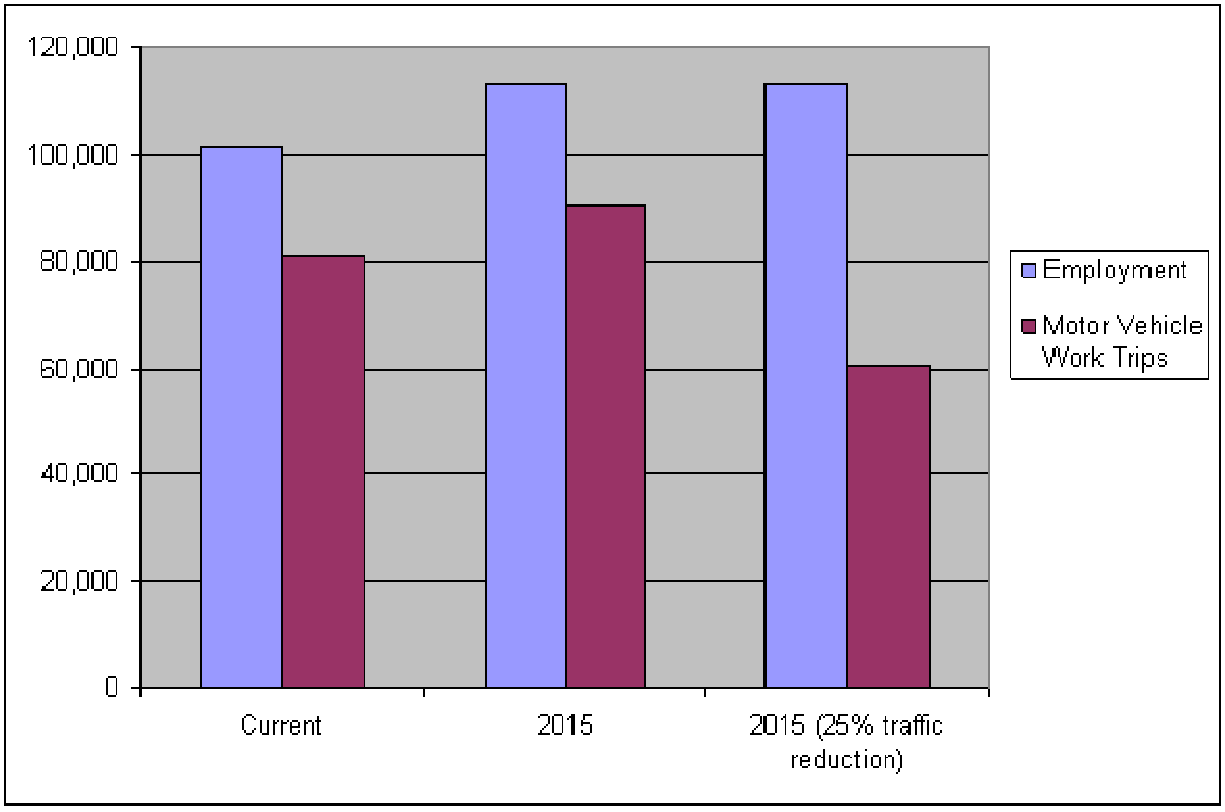
Perhaps most interestingly, transportation officials in many of these cities argue that their economies have prospered not in spite of their efforts to reduce motor vehicle traffic, but in good part because of their success in reducing reliance on the car. Their previous high drive alone rates, they suggest, were often the result of the inefficient subsidies that encouraged driving, worsened traffic congestion and reduced productivity, as drivers wasted more hours in traffic jams. By reducing these subsidies and investing in transportation alternatives, they conclude, they have created cities with more efficient transportation systems and better quality of life. This in turn has attracted new investment, while helping existing residents and employers be more productive.

Offsetting Growth

In Pasadena, to reach a goal of reducing existing traffic levels by 25% from current levels, these techniques for reducing drive alone rates would need to be applied in a way that not only results in all new development taking place without any increase in auto traffic, but also in reducing traffic to and from existing development by 25%. In addition, the level of pass-through auto trips (i.e., trips with neither origin nor destination in Pasadena) would need to be cut by 25%. In other words, to reduce existing traffic on Pasadena streets by 25%, drive alone rates need to fall by more than 25% and pass-through traffic needs to be discouraged -- unless, that is, Pasadena has no increase in residents, no increase in jobs and pass-through traffic declines.

To help illustrate this point, Figure 1-1 shows the projected increase in employment and motor vehicle work trips in Pasadena by the year 2015 under current policies. (Of course, evening rush-hour traffic in Pasadena consists of more than just work trips. However, in order to simplify the analysis, this chart focuses on work trips by those who work in Pasadena.) As shown in the first two columns, under current policies and plans, employment in Pasadena is projected to grow from 100,000 to a bit over 110,000 by the year 2015. If driving rates stayed the same, then motor vehicle work trips in the evening rush-hour would grow from about 80,000 trips to nearly 90,000 trips. Therefore, to reduce work trips in the evening rush-hour by 25% from their *existing* levels, a 32.9% reduction in driving rates would be needed to offset projected growth.

Figure 1-1 Motor Vehicle Work Trips Compared to Future Employment



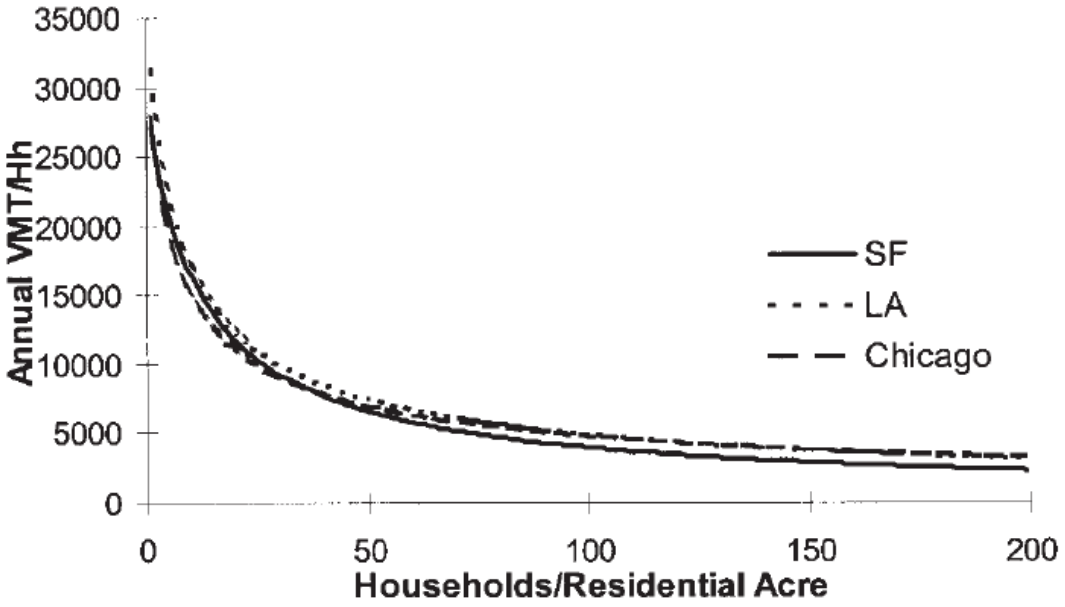
The Role of Land Use and Urban Design

As Pasadena recognizes, the shape of the city plays a critical role in how much and how often people travel by car. When neighborhoods are compact, and many of a person's daily needs can be found within a few minutes walk, vehicle trips per household decline rapidly. As shown in

Figure 1-2 and Figure 1-3, in the Los Angeles region, there is a very strong correlation between the density at which people live (measured in these graphs in households per residential acre), the number of vehicle miles per year that a household drives (see

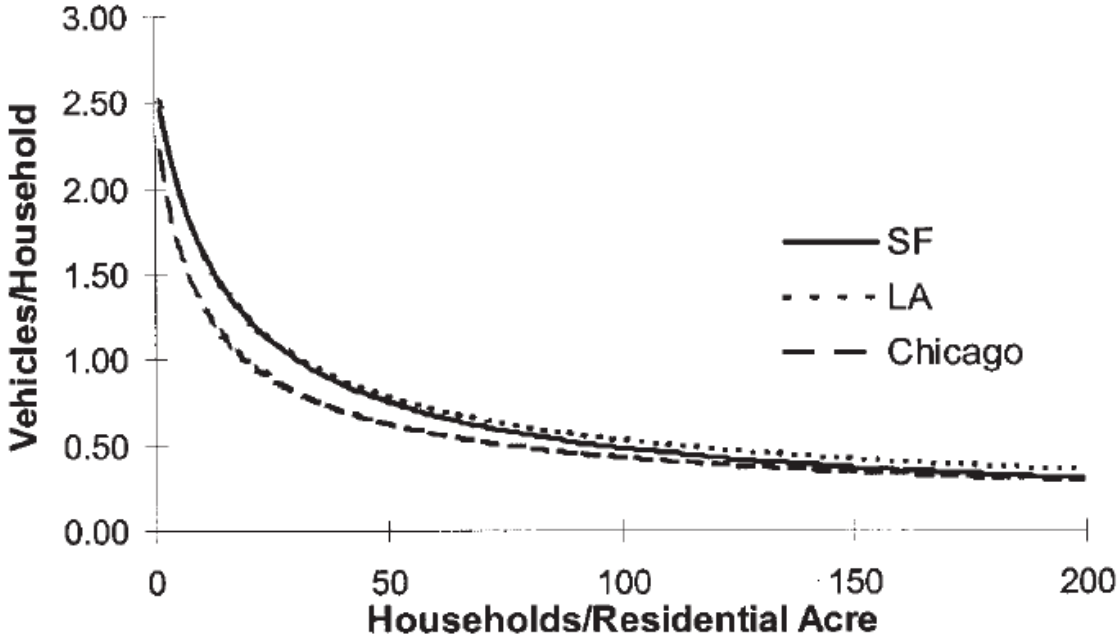
Figure 1-2) and the number of vehicles that a household owns (see Figure 1-3).

Figure 1-2 Residential Density Vs. Vehicle Travel



Source: Holtzclaw et. al. (2002).[2]

Figure 1-3 Residential Density Vs. Auto Ownership



Source: Holtzclaw et. al. (2002).[3]

However, for several reasons, this report spends relatively little time discussing the relationships between urban form and motor vehicle trips. Pasadena's General Plan already emphasizes the importance of transit oriented development, the creation of mixed-use neighborhoods and pedestrian friendly places, and establishes clearly where and in what form such development should take place. Other plans, guidelines and code provisions, such as the City of Gardens ordinance, describe how and why buildings should be designed to respect the pedestrian. Attempting to repeat that guidance in this report would add little to Pasadena's established policy. At the micro level, good urban design, such as the creation of inviting pedestrian places, is also highly specific to the particulars of a site, and the effects of urban design on travel behavior -- for example, lining a street with lively shop fronts, rather than a blank wall -- often seem obvious to any pedestrian, but are frustratingly difficult for transportation researchers to quantify.

Finally, Pasadena's General Plan contemplates the building of relatively little additional housing and employment, compared to the amount that already exists. Therefore, to reach a goal of major traffic reduction, much of Pasadena's attention must focus on reducing trips from existing homes and workplaces.

Given all of these considerations, this study takes Pasadena's proposed land-use plans, as described in the General Plan, largely as a given. The form of the city with which one has to work, then, is one composed of both compact, dense and highly mixed-use centers and corridors, with good transit service, and much lower density neighborhoods of single-family homes. Figure 1-4 shows Pasadena's variation in density by census tract while Figure 1-5 shows the average number of vehicles per household by census tract: as one can observe, the lowest density neighborhoods generally average more than two cars per household, while in the denser centers and near downtown, average vehicle ownership falls significantly. In Pasadena, traffic reduction efforts, such as the design of transit, must be adapted to this largely established form.

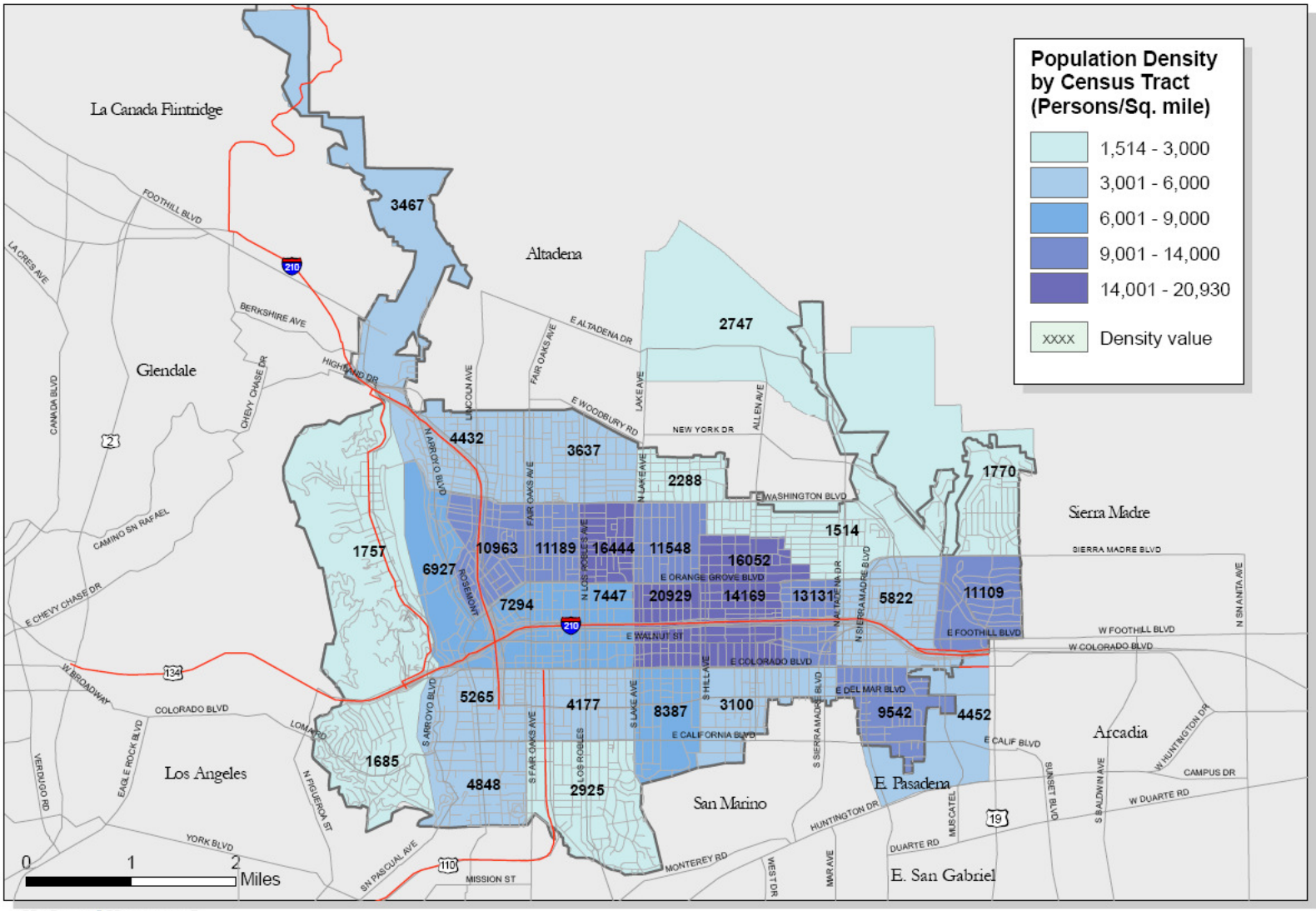
Pasadena and the Region

With nearly 150,000 residents and its significant role as a regional center of employment, culture and nationally known attractions, Pasadena is a significant place. However, in a region as large and as multi-centered as Los Angeles, people's daily trips frequently begin in one city and end in another. As a result, the best strategies for decreasing trips must include partnerships with area cities, transit operators and other agencies—it is very difficult for one city to simply “go it alone”, since development activity and traffic does not respect city boundaries.

Pasadena's General Plan sets the tone for the Mobility Element with the Guiding Principle, “Pasadena will be a city where people can circulate without cars.” The focus on a city where people can circulate without cars raises the question, “Who is currently moving in and through Pasadena and what can be done to change the ways that they move around?” Figure 1-6 briefly describes the types of trips that occur, using a framework that considers both the origin and destination of people's trips.

[2] Holtzclaw, J. Et Al (2002) Location Efficiency: Neighborhood And Socioeconomic Characteristics Determine Auto Ownership And Use – Studies In Chicago, Los Angeles And San Francisco. *Transportation Planning and Technol.,* Vol. 25, pp. 1–27.
[3] Ibid.

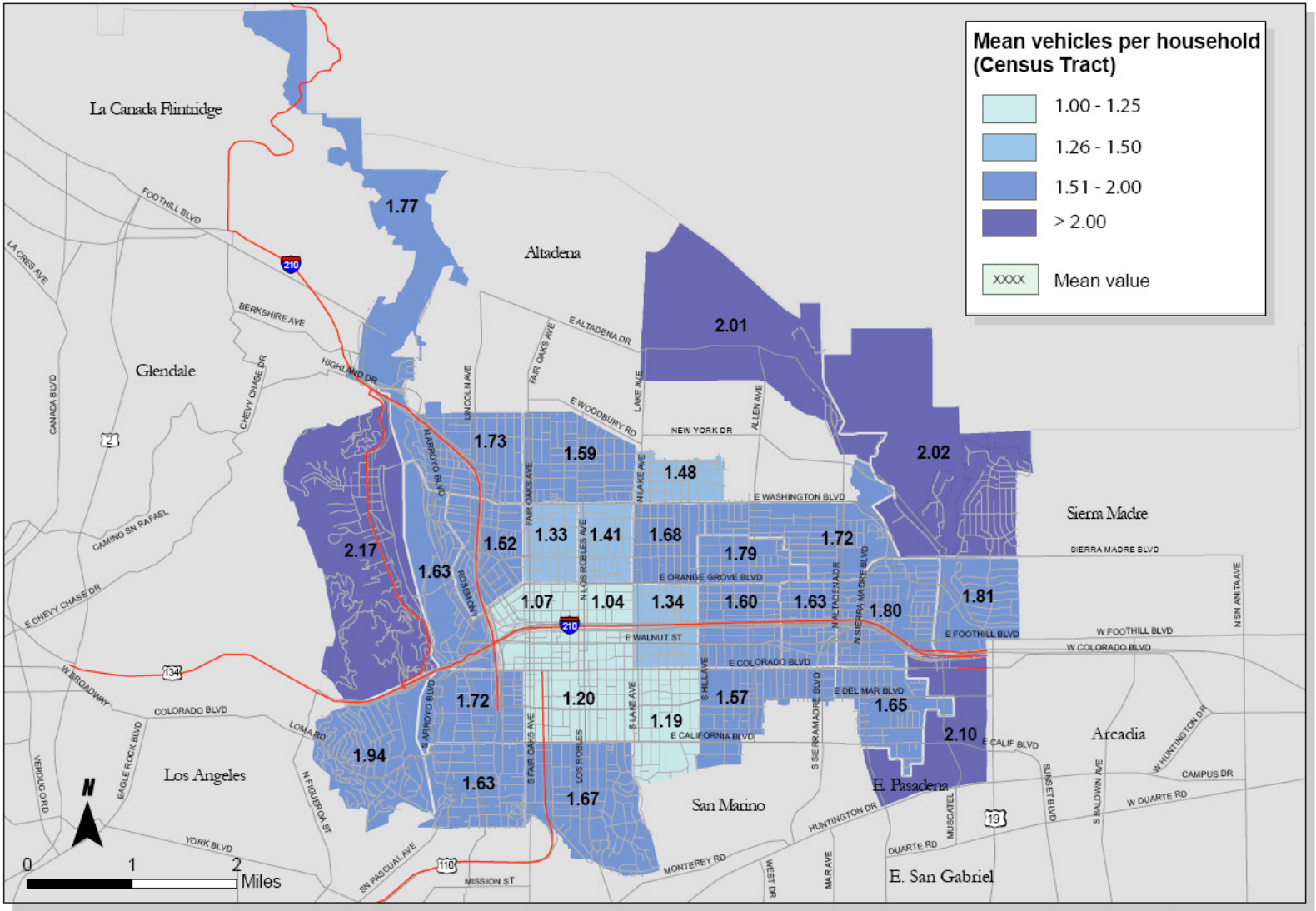
Figure 1-4 Pasadena Population Density



Nelson\Nygaard consulting associates

GIS Data Source: Census 2000
Location: Pasadena, CA

Figure 1-5 Pasadena Household Vehicle Ownership



Nelson|Nygaard consulting associates

Figure 1-6 Movements Within and To/From Pasadena

		Trip Destination	
		Within Pasadena	**Outside Pasadena**
Trip Origin	**Within Pasadena**	Short trips of all types, including walking, bicycling to school, shopping etc. Affected by land use, transportation, and parking policies. City-wide trips. Affected by transit, shuttle, bicycle, and walking alternatives via land use and transportation policy as well as wokplace policies.	Primarily work trips, as well as social/ recreational/shopping trips. The primary local strategy is to improve transit and transit-oriented land use. Affected by residential parking policy, land use policy, transit service.
	Outside Pasadena	Primarily work and shopping trips. Affected by workplace policies – TDM, parking supply and pricing, retail parking strategies, transit accessibility.	Through trips of all types, e.g., Altadena to downtown LA or the San Gabriel Valley to Burbank. Most factors affecting travel mode are outside of City's influence, except through road pricing or road use restrictions.

For many of these trips, it is clear that Pasadena's partners play an important role, and can strongly affect the number of vehicle trips that wind up on Pasadena streets. To help illustrate the situation, consider an extreme case. If all Pasadena residents and all Pasadena workers stopped driving entirely, Pasadena's city streets would not be free of cars. The existing pass-through traffic (with neither origin nor destination in Pasadena), amounting to about one third of all vehicle trips, would continue to pass through. Moreover, since the removal of all local trips would reduce delays for pass-through traffic, cutting through Pasadena on local streets would become more attractive, and it is likely that more pass-through traffic would be induced. How much would this "rebound effect" do to fill the roads back up again? The answer is difficult to determine, but the evidence suggests that at least some new pass-through trips would be induced.

Neighboring cities, regional agencies, the state and federal agencies all affect Pasadena, and to best reduce traffic, Pasadena will need to actively partner with all of them. In many areas, Pasadena and its neighbors are already collaborating and moving in the same direction: for example, in building new rail lines and rapid bus lines, and focusing development around transit stops. The East-West Corridor Transit Study, which is developing an express transit service linking Burbank, Glendale and Pasadena, is just one example of the partnerships now under way between Pasadena and its neighbors. In other areas, however, Pasadena's potential partners have policies that worsen traffic. For example, when it comes to improving employee benefits for those who do not drive, federal tax law is at cross purposes with Pasadena's goal.[4] And in some arenas, such as congestion pricing, Pasadena cannot take action without a change in state law. However, Pasadena is not helpless. There is a great deal that the city can do on its own, using policy levers under its own control, to reduce car trips.

[4] For example, if employers provide free parking for their employees as a fringe benefit, the benefit is tax-free for both employer and employee, up to $205 per month; but if employers offer an equivalent subsidy in cash to employees who bike or walk to work (a "parking cash-out" program), federal tax is due on the entire amount.

Chapter 2. A Brief and Highly Selective History of Efforts to Relieve Traffic Congestion in Pasadena

Exactly one century ago, in 1906, Henry Ford started up his first assembly line, and began churning out motorcars by the tens of thousands. Almost overnight, he transformed the automobile from a mostly handmade plaything for rich men to transportation (albeit still expensive) for regular people. It is worth recalling how quickly this change happened, for several reasons. First, it reminds us that humanity has had barely 100 years to consider how to handle the tremendous problems (as well as tremendous benefits) created by the arrival of hundreds of millions of automobiles. Second, with the benefit of hindsight, we can reevaluate whether policy experiments that were undertaken beginning in the 1920s have worked out as intended.

Pasadena's first responses to the growing numbers of cars focused on making room for additional lanes of moving traffic. In 1929, the fronts of the buildings along Colorado Boulevard were chopped off and moved back 14 feet on each side, widening the street to its present day width and making room for two more lanes. Arroyo Parkway, the first limited access highway to Pasadena, was next. Just half a century ago, in 1956, President Eisenhower signed the federal highway bill authorizing construction of the interstate freeway system, so that by the 1970s, hundreds of buildings in the path of the new 210 Freeway through Pasadena were being demolished.

These roadbuilding decisions, often taken at the level of federal and state government (frequently with broad public support) dramatically reshaped Pasadena and set it clearly on an auto-oriented course. In more recent decades, however, Pasadena and the region have made concerted efforts to create more alternatives to driving alone. Creating the ARTS bus system, adopting trip reduction ordinances, building the Gold Line, implementing bicycle and pedestrian plans, and many other City efforts have been working to give residents and workers more transportation choices.

For the purposes of this study, however, the transportation history that is of most interest is an area of policy that has been less noticed and less studied.

The remainder of this short history of transportation policy in Pasadena focuses on parking policy. Why examine this seemingly obscure and perhaps dull topic? First, unlike decisions about the operations of the 210 Freeway or federal funding for light rail, parking policy decisions lie squarely in the hands of the City of Pasadena. Second, this report will argue, parking policy is perhaps the single most important lever within Pasadena's grasp for affecting the quantity of traffic on Pasadena city streets. Third, as one Southern California real estate developer puts it, "Parking is destiny." Parking requirements, as written into the zoning codes of most every California city, dominate architecture, powerfully shaping the form of our buildings and dictating what is financially feasible to build.

When did Pasadena first adopt minimum parking requirements, and why? The exact year in which Pasadena first adopted minimum parking requirements is unknown, but judging from both

the architecture of Pasadena's historic buildings, and the history of similar California cities, Pasadena's first minimum parking requirements probably went into effect in the first decade after World War II.[5]

Why were they adopted? According to the zoning code, Pasadena's minimum parking requirements were adopted to "alleviate or prevent traffic congestion and shortages of curbside parking spaces".[6] Has it worked? For half a century, virtually every city in southern California has had minimum parking requirements, and yet not only has traffic congestion gotten worse, it is projected to steadily worsen over the next 20 years.

As described in later sections, several of the cities with the strongest records of reducing vehicle trips and traffic congestion have eliminated minimum parking requirements, and instead now have *maximum* parking requirements (that is, they limit the number of spaces allowed at each building). These cities now regard maximum parking requirements - the opposite approach - as an essential tool for preventing traffic congestion.

Why was it believed that setting minimum parking requirements would alleviate traffic congestion? By the 1920s, the new problem of "spill-over parking" had already arrived in many downtowns. Automobiles filled up all of the curb parking in front of shops and apartments, and any nearby private parking, and then sometimes spilled over into nearby neighborhoods, crowding the streets there. In search of free parking near their destination, motorists often took to circling about, waiting for a space to open up. Figure 2-1 shows the observed patterns of various motorists circling in search of parking spaces in Chicago in 1939. The study, undertaken by Wilbur Smith, was carried out by recording vehicles that repeatedly passed through a busy intersection during the evening hours.

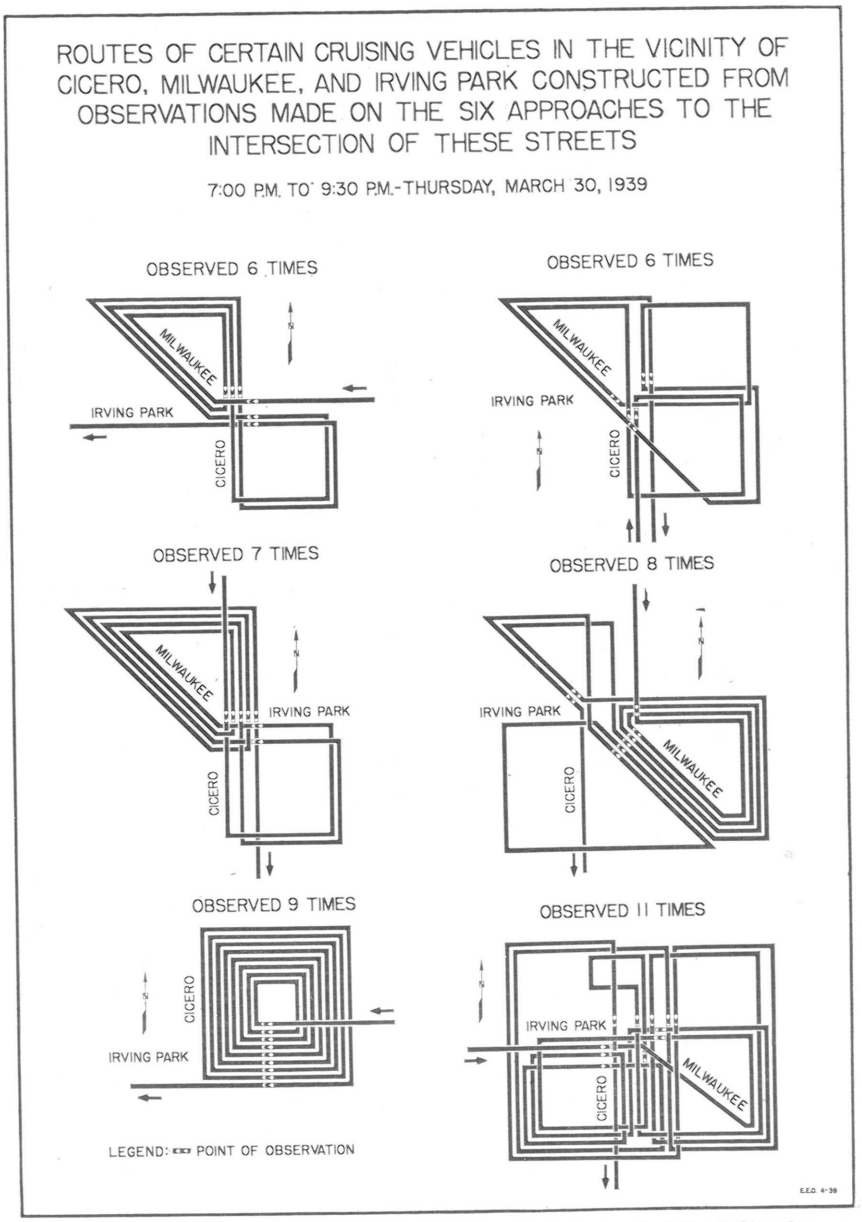
In several studies conducted throughout the 20th century, researchers studying cruising in urban areas found that, as Professor Shoup summarizes, "Between 8 and 74% of traffic was searching for parking, and it took between 3.5 and 13.9 minutes to find a curb space."[7] (See Figure 2-2)

Instead of searching for parking, many motorists simply double-parked, clogging traffic lanes and greatly increasing congestion. Perhaps most importantly, well-known traffic engineers, such as Wilbur Smith, pointed out that if enough off-street parking were built to meet all possible demand, it would be much easier to prohibit on-street parking. The streets could then be filled from sidewalk to sidewalk with moving traffic.

The desire to take over the curb lanes for traffic, along with the problems of double parking and cruising for parking spaces, led to a new idea: the minimum parking requirement. In 1923, Columbus, Ohio adopted the first off-street parking requirement, requiring one parking space for each apartment in new apartment buildings. In 1939, Fresno became the first city to adopt minimum parking requirements for any use besides housing, adopting them for hotels and hospitals. The essential concept was that if each destination provided ample parking, with enough spaces available so that even when parking was free there would be plenty of room, then there would be plenty of spaces at the curb.

[5] UCLA Professor Donald Shoup writes that a 1946 survey of 76 cities found that only 17% had parking requirements in the zoning ordinances. Five years later, 71% of the cities had parking requirements or were adopting them. Refer to: Shoup, Donald. 2005. *The High Cost of Free Parking.* Chicago: Planners Press. Page 22.
[6] City of Pasadena Zoning Code, Chapter 17.46.010.
[7] Shoup, Donald. 2005. *The High Cost of Free Parking.* Chicago: Planners Press. Page 290.

Figure 2-1 Observed Routes of Cruising Vehicles in Chicago, 1939



From the Report: "A Plan to Relieve Traffic Congestion in the Portage Park Retail Shopping Center." A Survey by City of Chicago, Chicago Motor Club, Chicago Surface Lines, April 1939

FIGURE 4—Observed Routes of Cruising Vehicles

Figure 2-2 Twentieth-Century Cruising

Year	City	Share of traffic cruising (percent)	Average search time (minutes)
1927	Detroit (1)	19%	
1927	Detroit (2)	34%	
1933	Washington		8.0
1960	New Haven	17%	
1965	London (1)		6.1
1965	London (2)		3.5
1965	London (3)		3.6
1977	Freiburg	74%	6.0
1984	Jerusalem		9.0
1985	Cambridge	30%	11.5
1993	Cape Town		12.2
1993	New York (1)	8%	7.9
1993	New York (2)		10.2
1993	New York (3)		13.9
1997	San Francisco		6.5
2001	Sydney		6.5
Average		**30%**	**8.1**

The numbers after Detroit, London, and New York refer to different locations within the same city.

Source: Shoup, D. (2005) The High Cost of Free Parking. Chicago: Planners Press. Page 290.

Motorists would no longer need to circle the block looking for a space, and so traffic congestion would be lessened. As a matter of both American policy and law, the concept is well-established. For example, in a 1975 court ruling on off-street parking requirements, the Colorado Supreme Court ruled:

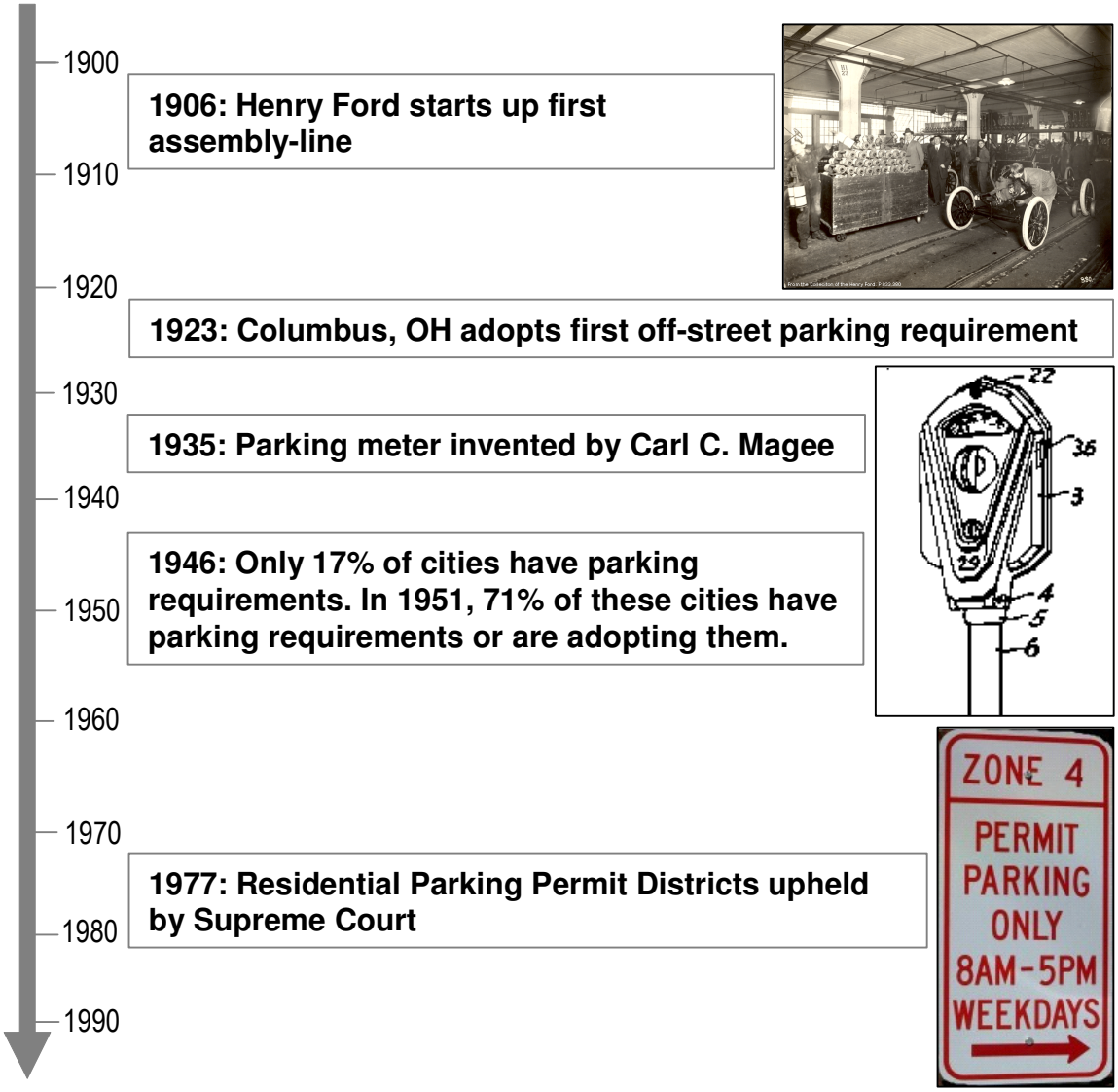
> *Studies of traffic problems uniformly find air pollution to be related to autoists moving slowly around block after block seeking a place to park. In these days of environmental concern, we cannot believe that it is unconstitutional to require those who invite large numbers of people to their establishments--who in turn clog the streets, air and ears of our citizens--to provide parking facilities so that automobiles may be placed in a stall and stilled.*[8]

In 1923, when minimum parking requirements were first invented, they probably appeared to be the only solution for the novel problem of cars filling up all of the curb space. It was not until 1935, in Oklahoma City, that the parking meter would be invented and then spread rapidly to other cities (see timeline in Figure 2-3). Even then, minimum parking requirements likely appeared to be the only reasonable solution for preventing spillover parking in many areas, given the relatively high cost of installing and enforcing meters. Moreover, land was cheap and there were ample orchards and fields yet to be developed all over Southern California, so the cost of complying with minimum parking requirements might have seemed fairly low. The concept of Residential Permit Parking Districts, which reserve curb spaces for residents and their guests,

[8] Shoup, Donald. 2005. *The High Cost of Free Parking.* Chicago: Planners Press. Page 277.

and effectively prevent spillover parking, had not yet been invented. The nation's first to be challenged in court, in Arlington, Virginia, was upheld by the Supreme Court in 1977, and thereafter, Residential Permit Parking districts spread rapidly throughout the country.

Figure 2-3 History of Off-Street Parking Requirements



Minimum parking requirements, however, had unintended consequences for traffic. When considering the problem of traffic congestion created by cruising for parking, and the concept of minimum parking requirements as a cure for this congestion, one thing is often overlooked. In city after city, from Seattle to San Francisco to Sarasota, the motorists circling the block are not just looking for a parking space. They are looking for a space that is cheap or free. As Shoup explains:

> Apart from the disappearance of traffic officers at every corner, cruising for parking has changed little since the 1920s. Where curb parking is free and off-street parking is expensive, some drivers doggedly search for a free curb space rather than pay to park off-

> street. Parking surveys in Seattle in 2000, for example, found "spaces were often readily open in off-street *pay* lots, although *free* on-street parking was full to overflowing."

Therefore, in order for minimum parking requirements to end the problem of cruising traffic, they had to result not simply in lots of available off-street parking spaces. They had to result in the creation of ample *free* parking spaces close to every possible destination. Some California parking requirements explicitly require this. The Park Mile Specific Plan for Wilshire Blvd. in Los Angeles achieves this by specifying that:

> In order to mitigate traffic congestion on the public right-of-way, for office and other commercial uses, there shall be at least three parking spaces provided for each 1000 ft.² of gross floor area available at no charge to all patrons and employees of those uses (City of Los Angeles, *Planning and Zoning Code, 1989 Edition).*[9]

Pasadena, like most California cities, did not explicitly require free parking, but did set minimum parking requirements that were simply high enough to satisfy the demand for parking even when parking was given away for free. Forcing the creation of this much supply had the predictable result of ensuring that most destinations in fact did wind up with free parking.

What were the consequences? Hawley Simpson, who conducted the first research on cruising for parking (and who later became president of the Institute of Traffic Engineers), predicted the problems that later arose from free off-street parking. "Rather than assisting in solving the street traffic problem" he said, "it may very probably have the opposite effect by inducing a large amount of unnecessary vehicle usage. Free storage is an economic fallacy."[10]

Decades later, researchers conducted numerous studies demonstrating that Hawley Simpson's observation was right. Dozens of studies have now demonstrated that when parking is given away free of charge, people drive more. The amount of extra driving induced is substantial. Figure 2-4 and Figure 2-5 summarize the results of studies of commuters in Los Angeles and elsewhere. They show the reduction in parking demand and traffic that occurs when parking subsidies are removed or reduced. Regarding the studies in the Los Angeles area, note that several of the study locations had little or no transit service (all studies were carried out *before* any of the Metro rail lines opened), and yet parking prices were still effective in reducing auto trips. In the study of the Warner Center, for example, where a $49 per month parking fee (in today's dollars) resulted in a 30% decrease in autos driven to work, none of the employees rode transit: the primary alternative to driving alone, in this case, was carpooling.

As Figure 2-5 shows, removing or reducing parking subsidies - subsidies that have been in good part created by minimum parking requirements - reduced vehicle trips by an average of 27%, in the mostly Southern California case study shown here. Given Pasadena's goal for this study - figuring out how to reduce traffic by 25% - the role played by parking requirements cannot be overlooked.

As is shown later in this report, the parking prices shown in the tables below are no higher than the actual cost to build and operate a parking space in the locations studied, and in several cases, the parking charges shown cover only a fraction of the actual cost. In Pasadena, of course, while some downtown locations have paid parking, parking at most destinations is free. What does it cost to provide all of this free parking in Pasadena?

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[9] Shoup, Donald. 1992. *Cashing out Employer-Paid Parking,* Washington, DC: Federal Transit Administration. Page 93.
[10] Ibid. Page 280.

Figure 2-4 Employee Parking Pricing Effect on Parking Demand

Location	Scope of Study	Parking Fee in $/Month (2006 $)	Decrease in Parking Demand
Group A: Areas with little public transportation			
Century City, CA[1]	3500 employees at 100+ firms	$107	15%
Cornell University, NY[2]	9000 faculty and staff	$45	26%
Warner Center, CA[1]	1 large employer (850 employees)	$49	30%
Bellevue, WA[3]	1 medium-size firm (430 empl)	$72	39%
Costa Mesa, CA[4]	State Farm Insurance employees	$49	22%
Average		$64	26%
Group B: Areas with fair public transportation			
Los Angeles Civic Center[1]	10,000+ employees, several firms	$166	36%
Mid-Wilshire Blvd, LA[1]	1 mid-sized firm	$119	38%
Washington DC suburbs[5]	5500 employees at 3 worksites	$90	26%
Downtown Los Angeles[6]	5000 employees at 118 firms	$167	25%
Average		$135	31%
Group C: Areas with good public transportation			
University of Washington[7]	50,000 faculty, staff and students	$24	24%
Downtown Ottawa[1]	3500+ government staff	$95	18%
Average		$59	21%
Overall Average		$89	27%

Sources:
[1] Willson, Richard W. and Donald C. Shoup. "Parking Subsidies and Travel Choices: Assessing the Evidence." *Transportation*, 1990, Vol. 17b, 141-157 (p145).
[2] Cornell University Office of Transportation Services. "Summary of Transportation Demand Management Program." Unpublished, 1992.
[3] United States Department of Transportation. "Proceedings of the Commuter Parking Symposium," USDOT Report No. DOT-T-91-14, 1990.
[4] *Employers Manage Transportation*. State Farm Insurance Company and Surface Transportation Policy Project, 1994.
[5] Miller, Gerald K. "The Impacts of Parking Prices on Commuter Travel," Metropolitan Washington Council of Governments, 1991.
[6] Shoup, Donald and Richard W. Wilson. "Employer-paid Parking: The Problem and Proposed Solutions," *Transportation Quarterly*, 1992, Vol. 46, No. 2, pp169-192 (p189).
[7] Williams, Michael E. and Kathleen L Petrait. "U-PASS: A Model Transportation Management Program That Works," *Transportation Research Record*, 1994, No.1404, p73-81.

Figure 2-5 Employee Parking Pricing Effect on Auto Commute Rates

	Autos Driven per 100 Employees		
Case Study and Type	Employer Pays for Parking	Driver Pays for Parking	Decrease in Auto Trips
Mid Wilshire, Los Angeles (before/after)	48	30	-38%
Warner Center, Los Angeles (before/after)	92	64	-30%
Century City, Los Angeles (with/without)	94	80	-15%
Civic Center, Los Angeles (with/without)	78	50	-36%
Downtown Ottawa (before/after)	39	32	-18%
Average of Case Studies	70	51	-27%

Source: Willson, Richard W. and Donald C. Shoup. "Parking Subsidies and Travel Choices: Assessing the Evidence." Transportation, 1990, Vol. 17b, 141-157 (p145).

Figure 2-7 shows the estimated cost to comply with City transportation and parking requirements for five typical development projects in Pasadena. The project descriptions are taken from five recently approved development projects in Pasadena. The costs shown are of three kinds. There is the cost to install specific improvements to mitigate traffic impacts near the site, such as installing a new traffic signal. There is the cost to comply with the City's transportation impact fee, which was recently updated to raise more revenue for improvements, including especially alternative transportation. Finally, there is the cost of building the parking spaces required to meet minimum parking requirements. Because of Pasadena's high land values, four of the five projects have underground parking, with an average capital cost estimated conservatively at $26,000 per space. The fifth project, the medical office building, used aboveground structured parking with an estimated capital cost of $22,000 per space. For minimum parking requirements, Pasadena's reduced requirements for transit oriented developments were used, making these costs a conservative estimate.

To help assess the spending that results from current policy, the costs are divided up by category (i.e. Intelligent Transportation Systems, additional roadway capacity, traffic calming/bicycle/pedestrian, transit and parking). If we ignore parking and only look at the fee-related costs (see Figure 2-8), the fee practice allocates almost half to roadway improvements. Another 10% is allocated to ITS and more than 40% is allocated to transit and walking/biking.

However, when totaling up the cost of transportation-related mitigations *and parking requirements* for these five typical projects, the percentage on spending in each category is as shown in Figure 2-6 and Figure 2-7. The total cost to meet all the requirements is $24.6 million: building parking accounts for more than $23 million of this sum. Parking accounts on average for 94.5% of the costs. Consequently, this is a significant cost to any commercial or multi-family development. As these sample projects show, complying with off-street parking requirements in Pasadena costs a great deal of money, although this cost is hidden in higher prices for everything except parking itself.

Who pays for all of this free parking? As Professor Shoup describes it:

> Everyone does, even if they don't drive. Initially the developer pays for the required parking, but soon tenants do, and then their customers, and so on, until the cost of parking has diffused everywhere in the economy... We unknowingly support our cars with almost every commercial transaction that we make because a small share of the money changing hands pays for parking. Residents pay for parking through higher prices for housing. Businesses pay for parking through higher rents for their premises. Shoppers pay for parking through higher prices for everything they buy. We don't pay for parking in our role as motorists, but in all our other roles--as consumers, investors, workers, residents, and taxpayers--we pay a high price. Even people who don't own a car have to pay for "free" parking…
>
> Off-street parking requirements collectivize the cost of parking because they allow everyone to park free at everyone else's expense. When the cost of parking is hidden in the price of other goods and services, no one can pay less for parking by using less of it. Bundling the cost of parking into higher prices for everything else skews travel choices toward cars and away from public transit, cycling and walking.[11]

[11] Ibid. Pages 2-3.

Figure 2-6 Estimated Costs for Transportation-Related Mitigation Measures for Recently Approved Pasadena Projects, Using New Fee Schedule (July, 2006)

Type	Project Scope	Under New Transportation Impact Fee Schedule					
		ITS	Roadway Capacity	Traffic Calming, Bike/Ped, Monitoring	Transit	Parking (Using min. req's in TOD)	Total
Mixed Use	54 Single-family Condominium & 7,000 s.f. commercial (demolishing 6,876 s.f. commercial)	Impact Fee: $17,381	Impact Fee: $56,035 Signal Modification: $46,000	Impact Fee: $6,390	Impact Fee: $55,184	$2,588,844	$2,769,834
Medical Office	130,000 s.f. medical office	Impact Fee: $62,267	Impact Fee: $200,745	Impact Fee: $22,892 NTMP: $30,000	Impact Fee: $197,697	$14,011,920	$14,525,521
Residential	17 condos (net new 16)	Impact Fee: $5,109	Impact Fee: $16,471	Impact Fee: $1,878 NTMP: $5,000	Impact Fee: $16,221	$660,816	$705,495
Retail	76,205 s.f. supermarket	Impact Fee: $54,162	Impact Fee: $174,614 New Signal: $140,000	Impact Fee: $19,912	Impact Fee: $171,963	$5,331,968	$5,892,619
Mixed Use	Retain existing retail and construct 16 condos	Impact Fee: $5,109	Impact Fee: $16,471	Impact Fee: $1,878 NTMP: $5,000	Impact Fee: $16,221	$621,944	$666,623
Total Cost		**$144,027**	**$650,336**	**$92,951**	**$457,286**	**$23,215,492**	**$24,560,093**
% of Total Cost		**0.6%**	**2.6%**	**0.4%**	**1.9%**	**94.5%**	**100.0%**

Source: Pasadena DOT (2006) Estimated Costs for Transportation-Related Mitigation Measures Based on Recently Approved Projects/Developments in Pasadena (Working Draft).
Note: Impact fee distribution between the following categories: 13% ITS; 42% Roadway Capacity; 5% Traffic Calming; 41% Transit. Based on assumptions from *Pasadena Transportation Improvement and Traffic Reduction Fee – Transportation Improvement Included in the Fee Calculation* (Pasadena DOT, 2006).

Figure 2-7 Estimated Transportation-Related Development Costs, Including Parking Expenses

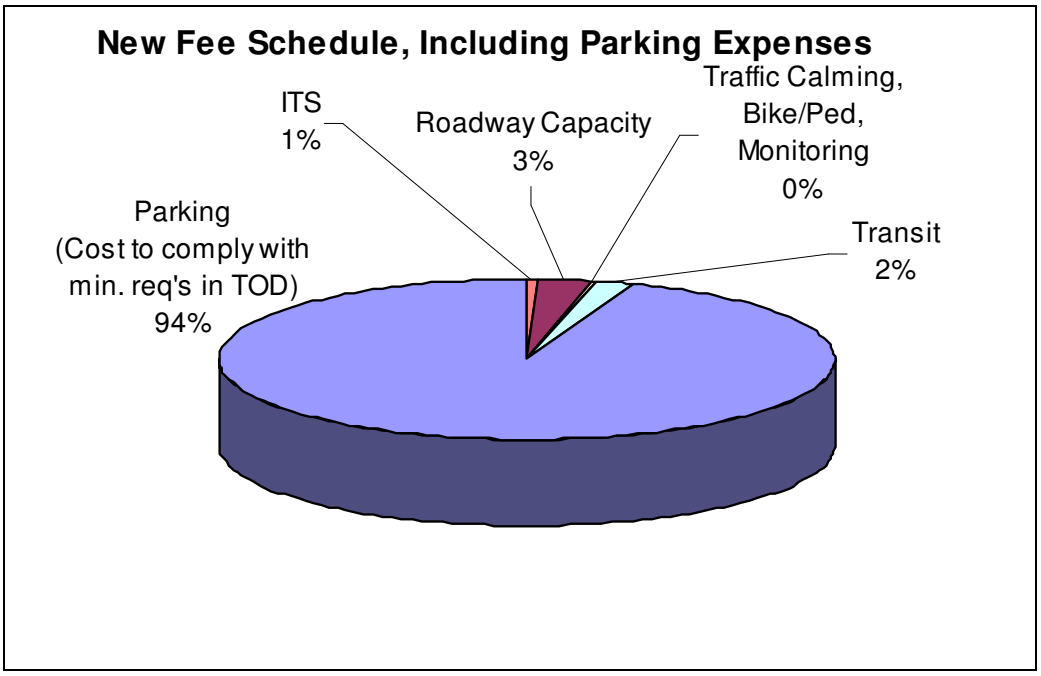
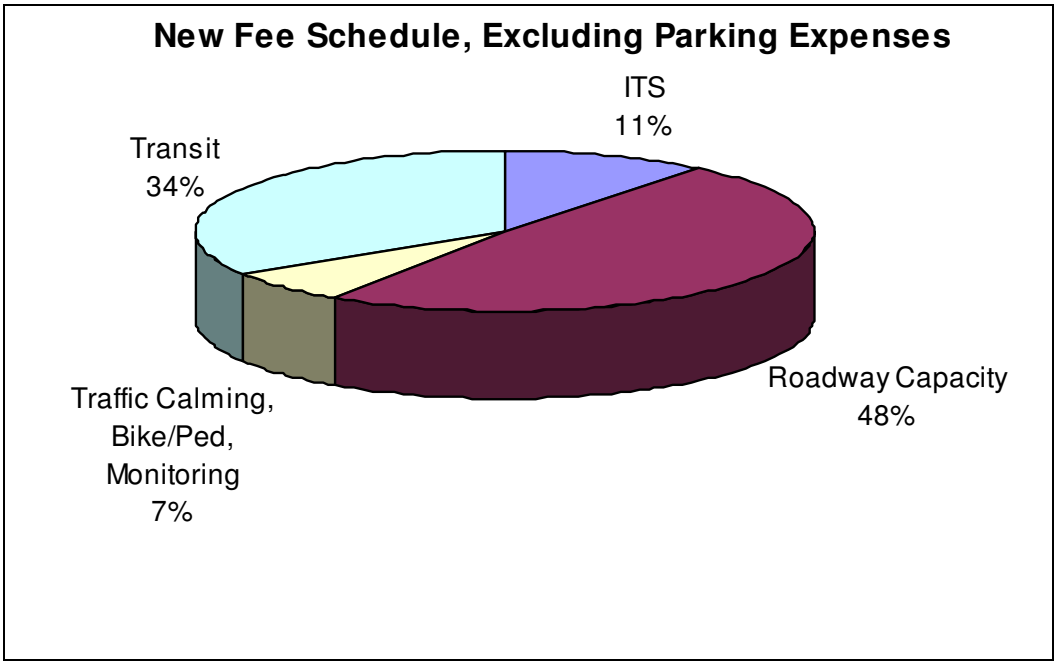


Figure 2-8 Estimated Transportation-Related Development Costs, Excluding Parking Expenses



When asked why he robbed banks, Willie Sutton famously said, "Because that's where the money is." The case for paying attention to spending on parking in Pasadena is similar: because that is where a good deal of transportation spending is going. The cost is hidden, and therefore often almost unnoticed. However, this does not make it any less important. In transportation planning, as with many other fields, you tend to get what you pay for. When cities require large amounts of spending on parking and other automobile infrastructure, they tend to get large amounts of additional automobile usage.

Minimum parking requirements also give developers a strong incentive to build auto-oriented projects. *As of right*, under standard minimum parking requirements, developers may build projects with free parking and at least one parking space per person -- a formula for the maximum amount of traffic per person. Once developers have built a space for every person, they have little incentive to invest in transportation demand management programs to reduce parking demand. Once a great deal of money has been spent to build a parking structure, with enough space to park everyone for free, who would want to invest still more money to empty it out?

Minimum parking requirements also frequently set up a dynamic in the development approval process that works against traffic reduction. Developers who seek to build less parking are often seen as "trying to get away with something". Suppose that the developers of the five projects profiled on the previous page had sought to invest heavily in traffic reduction: for example, by spending $12 million on parking and $12 million on transportation demand management, instead of putting more than 94% of the transportation funding into free parking. Such a strategy would require special permission, introduce uncertainty and potential delays into the approval process, and is therefore seen by developers and employers as an uphill road.

By contrast, in the case studies profiled in this report, many of the employers, developers, districts and entire cities that have succeeded in reducing traffic have been able to fund their traffic reduction efforts using the savings reaped on parking construction costs. Oftentimes, especially in cities where land values and therefore parking costs are as high as in Pasadena, it is simply cheaper to reduce traffic and parking demand than to build additional parking.

The point of this brief history has been to show the power of good intentions and unintended consequences. Pasadena, like most American cities, imposed minimum parking requirements in order to cure the serious traffic congestion caused by cruising for free curb parking. The unexpected result, however, was to create far more driving.

Fortunately, Pasadena has more choices available to it than either: (a) accepting traffic congestion caused by cruising for free curb parking, or (b) imposing minimum parking requirements, which tends to lead to free parking everywhere and induces more driving. The following chapter summarizes some key lessons learned from Pasadena's past, from the large body of research literature on traffic reduction, and from the case studies of cities, presented later in this report, that have made noteworthy progress in reducing traffic.

In the following chapters, a great deal of attention is also paid to the political realities of reducing traffic. Any planner or elected official reading the preceding pages must have thought to themselves, "As an academic idea, reducing traffic by making people pay for parking sounds all well and good. But who really wants to stand up in a public meeting, or planning commission hearing, or especially in an election campaign, and try to argue against the merits of ample free parking?" When we consider that for American employees, for example, free parking is by far the most common employee benefit, who would win elections by trying to take it away? The remainder of this study is filled with examples of places that have successfully reduced traffic.

Sometimes, these places have leveled the playing field not by removing free parking, but by providing equally valuable subsidies to employees who don't drive. In other cases, neighborhoods and business districts have realized that the gains from ending free parking outweigh the pain of getting rid of it. They then built cities where one can live comfortably while walking, bicycling and taking transit. In each case, the place studied is part of a modern democracy, where planners and elected officials have to answer to voters. Pasadena voters may or may not wish to make the same choices. The point here is that if they wish to, there are options open, and there are real-world models to follow.

Chapter 3. A Recommended Set of Strategies for Reducing Traffic by 25%

Introduction

Literally hundreds of strategies for reducing traffic exist. Dozens of books, articles and even an online encyclopedia of traffic reduction techniques have been written. Many of these techniques could be at least somewhat useful in Pasadena. However, to provide a concise report and a clear focus, this chapter presents twelve fundamental recommendations for reducing traffic in Pasadena.

The recommendations are based on a thorough review of existing conditions in Pasadena, and oftentimes build on initiatives that Pasadena has already begun. In addition, they incorporate the most important lessons learned from the case studies of cities that have already reduced traffic, and from a large body of transportation research literature. Finally, this chapter attempts to tailor all of the recommendations to Pasadena's unique needs, character and vision for its future, using Pasadena's adopted General Plan as the fundamental guide.

The essential goal of this study is to identify a realistic set of strategies that would result in at least a 25% reduction in the number of vehicle trips taken on Pasadena streets during the evening rush hour. As a more modest alternative, a set that would result in a 10% reduction is also to be presented. To reach either of these goals, not all of the twelve strategies recommended in this chapter would necessarily need to be implemented. Moreover, the strategies could be mixed and matched in several different ways in order to reach these goals. Figure 3-1 summarizes the twelve recommended strategies. Each of these strategies could be implemented to a greater or lesser extent (e.g., a 50% reduction in parking subsidies, or a complete phaseout) and in numerous variations (e.g., providing free transit to all, or only to particular groups). Since describing even just the most important variations would take many pages, for brevity's sake, each of the recommendations in this chapter is generally presented in a single basic form and at full strength.

While not all twelve of the strategies recommended here are required to achieve a 10% reduction (or even a 25% reduction) in existing vehicle trips during the evening peak hour, at least one of the strategies -- *congestion pricing* -- is almost certainly essential to achieve such an ambitious target. As described earlier in this paper, pass-through trips, with neither origin nor destination in Pasadena, account for a substantial share of peak hour trips on Pasadena city streets. Even if all Pasadena residents and workers stopped driving completely, there would still be cars on Pasadena city streets. If, through a variety of programs, Pasadena reduces local trips, this will reduce delays for pass-through traffic. Cutting through Pasadena on crosstown city streets will become more attractive, and it is very likely that therefore more pass-through traffic would be induced. To fully counteract this "rebound effect", congestion pricing is the only remedy known to be effective.

This does not mean that the other strategies recommended here cannot be helpful or should not be pursued.

Figure 3-1 Twelve Recommendations for Reducing Traffic in Pasadena

1) **Charge the right price for curb parking.** Charge the lowest price that will leave one or two vacant spaces on each block -- that is, performance-based pricing. This will eliminate the traffic congestion caused by drivers cruising for parking.

2) **Return the meter revenue to the neighborhoods that generate it.** Revenue return will make performance-based prices for curb parking politically popular.

   a) Create additional commercial parking benefit districts, modeled after the Old Pasadena Parking Meter Zone.

   b) Establish Residential Parking Benefit Districts.

3) **Invest a portion of parking revenues in transportation demand management programs.**

4) **Provide Universal Transit Passes.**

5) **Require the unbundling of parking costs.**

   a) Unbundle parking costs from housing costs.

   b) Unbundle parking costs from commercial leases.

   c) Unbundle parking costs from the costs of other goods and services, with selected exceptions.

6) **Require Parking Cash-Out.**

7) **Strengthen transportation demand management requirements.**

8) **Improve transit.**

9) **Improve bicycle and pedestrian facilities and programs.**

10) **Remove minimum parking requirements for off-street parking.**

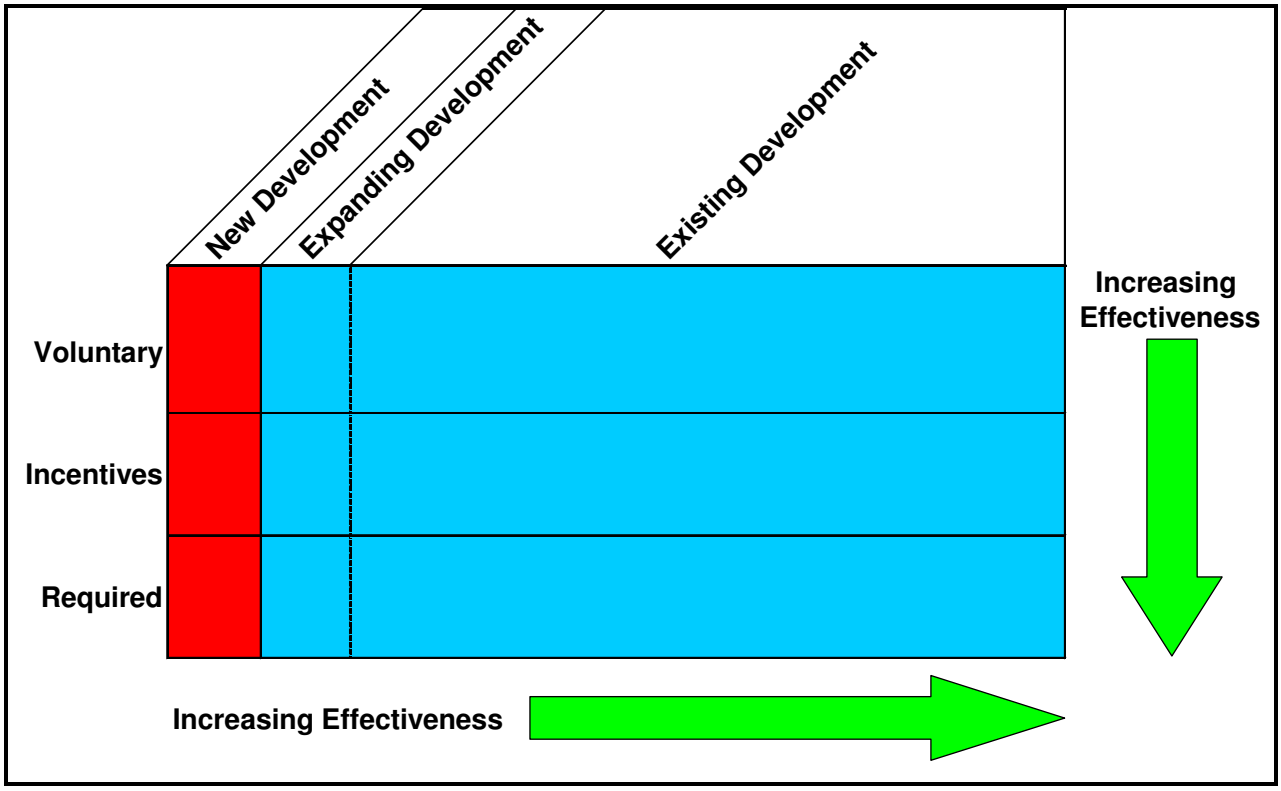
11) **Set maximum parking requirements.**

12) **Establish congestion pricing.**

As described in this chapter and in the case studies of other cities, these strategies can strongly affect the number of auto trips generated by development within Pasadena, giving residents better alternatives to driving alone. For the most part, they are strategies that Pasadena can implement on its own: by contrast, congestion pricing cannot be implemented without a change in state law. The strategies are also likely to be a useful first step before any attempt to institute congestion pricing is made. Congestion pricing, several studies have suggested, is more likely to be accepted by the public when better alternatives to driving alone are provided: the other eleven strategies recommended in this chapter are designed to do that.

The recommendations that follow could be implemented in different variations and could also be phased in over time. As shown in Figure 3-2, the results achieved will depend greatly on how widely the strategy is applied. In general, a strategy that is purely voluntary will attract some people; a strategy that creates new incentives for those who help reduce traffic will attract more people and have more effect; and a strategy that is required will affect all those who fall under the requirement. Strategies can also generally be applied just to new development, or to both new developments and to any land use which is seeking permission to expand, or to both existing developments and new development. Since the amount of new development is fairly small compared to the buildings that already exist (e.g., as described in Chapter 1, employment in Pasadena is projected to grow from 100,000 to a bit over 110,000 by the year 2015 under General Plan policies), applying strategies only to new development will affect perhaps only 10% of all development. Creating strategies that are applied to any site that seeks to expand (including both the new expansion and any existing buildings at the site) will expand the measures reach, and applying a strategy to all development, of course, will be the most effective.

Figure 3-2 Traffic Reduction Results Depend on a Measure's Scope



Putting Things in the Right Order

Some transportation strategies function effectively only if the proper groundwork has been laid. For example, the parking charges already in place at some Gold Line stations in Pasadena are an effective measure to reduce vehicle trips and encourage people to walk, bike or take transit to access the station, but they are effective only because City staff had the foresight to create residential parking permit districts and/or install parking meters around the stations. Where on-street parking is free and unregulated, parking charges for off-street spaces may simply result in

spillover parking problems and little traffic reduction. In the pages that follow, the necessary preconditions for the effectiveness of each recommended strategy are described. Because managing curb parking to prevent spillover parking problems is so important for the success of other traffic reduction measures, the recommendations for managing curb parking (Recommendations #1 and #2) are presented first in this chapter.

Two Sample Sets of Strategies: a 10% and a 25% Reduction in Traffic

As mentioned earlier, the recommended strategies could be mixed and matched in several different ways in order to reduce evening rush hour traffic by 10% (or by 25%), provided that a couple of caveats are met. To address pass-through trips, congestion pricing is almost certainly essential to fully achieve either goal. Second, as described above, transportation strategies often need to be applied as coordinated packages, with steps taken in the right order. Figure 3-3 shows one sample combination of the strategies which can be expected to achieve at least a 10% reduction in PM peak hour trips. The table describes three primary strategies, with predicted effects for each. Additional information on each strategy is provided in the Strategy Streets appendix of this report, as well as in the Case Studies section, which describes the experience of cities where these strategies are currently in use. These sections of the report provide supporting references on typical effects observed and the mechanics of implementation. The supporting strategies listed below describe measures that are either: (a) useful to avoid problems such as spillover parking, or (b) would provide additional trip reduction.

Figure 3-3 Sample Strategies for a 10% Reduction in Traffic

Primary Measures	
Require parking cash out, with a $5 per workday payment to non-drivers, for all employees at all worksites, both new and existing.	Typical effect observed: a $5 per workday parking cash out program will reduce employee commute trips by approximately 20%. Some additional reduction in non-work trips (e.g., shopping trips on the way home from work) would be expected as a result.
Require the unbundling of parking costs from housing costs at all multifamily developments, both new and existing, with a minimum price per parking space of $100 per month.	Typical effect observed: a $100 per month per parking space charge (offset by an equal reduction in rents) will result in a 15 to 30% reduction in household vehicle ownership and trips at the affected multifamily residences.
Institute congestion pricing at Pasadena's borders, with a minimum charge of $3 per entry or exit during peak hours.	Typical effect observed: a charge of $3 per entry or exit will result in at least a 20% drop in peak hour entries and exits at Pasadena's borders.
Supporting Measures	
Charge the right price for curb parking Return meter revenue to the neighborhoods that generate it. Invest parking revenues in TDM programs. Provide Universal Transit Passes. Strength in TDM requirements. Improve bicycle/pedestrian facilities and programs. Remove minimum parking requirements. Set maximum parking requirements.	

Necessarily, the table above presents a rough, overall planning-level estimate of the effects of the three recommended primary measures, based upon the transportation research literature regarding typical effects observed. Taken together, these three primary measures should achieve at least an overall 10% reduction in traffic. For simplicity's sake, the supporting measures are assumed to have no additional effect.

Figure 3-4 presents a sample set of strategies for achieving a 25% reduction in traffic. All of the measures are the same as in a 10% scenario, but the dollar amounts are increased to achieve a greater reduction. Again, this scenario provides only a rough, overall planning-level estimate of the effects of the three recommended primary measures. Note that all of the dollar amounts involved are doubled (e.g., a $10 per workday cash-out program for employees, rather than $5). However, in keeping with the normal principles of diminishing returns, a doubling of the dollar amount for each primary measure is not expected to result in a doubling of the effects achieved.

Figure 3-4 Sample Strategies for a 25% Reduction in Traffic

Primary Measures	
Require parking cash out, with a $10 per workday payment to nondrivers, for all employees at all worksites, both new and existing.	Typical effect observed: a $10 per workday parking cash out program will reduce employee commute trips by approximately 40%. Some additional reduction in non-work trips (e.g., shopping trips on the way home from work) would be expected as a result.
Require the unbundling of parking costs from housing costs at all multifamily developments, both new and existing, with a minimum price per parking space of $100 per month.	Typical effect observed: a $200 per month per parking space charge (offset by an equal reduction in rents) will result in a 20 to 40% reduction in household vehicle ownership and trips at the affected multifamily residences.
Institute congestion pricing at Pasadena's borders, with a minimum charge of $6 per entry or exit during peak hours.	Typical effect observed: a charge of $6 per entry or exit will result in at least a 30% drop in peak hour entries and exits at Pasadena's borders.
Supporting Measures	
Charge the right price for curb parking Return meter revenue to the neighborhoods that generate it. Invest parking revenues in TDM programs. Provide Universal Transit Passes. Strength in TDM requirements. Improve bicycle/pedestrian facilities and programs. Remove minimum parking requirements. Set maximum parking requirements.	

For readers who are familiar with traffic impact studies, the description of the estimates in these tables as approximate, planning-level estimates may be disappointing. After all, it is common for traffic impact studies of individual development projects to provide what appear to be highly precise estimates of the exact level of delay at particular intersections 25 to 30 years in the future (e.g., that an intersection will perform at Level of Service “D” in the year 2025, with an average delay of 42.7 seconds). However, as most transportation researchers can verify, predicting

transportation behavior is often complex, difficult and uncertain. Human behavior is complex, data is often lacking, and as a result, transportation models, while they may appear to be highly precise in their results, represent only best guesses. The tables above are meant to acknowledge that uncertainty explicitly. However, while the exact amount of traffic reduction that would be achieved by each of the individual strategies recommended in this paper is uncertain, particularly since the amount of reduction achieved would depend on how widely and how strongly a particular strategy is applied, there is considerable evidence (as described in the appendices to this report) to demonstrate that these strategies do in fact act to reduce traffic.

What Can Pasadena Do on Its Own?

As discussed in Chapter 1, under Pasadena and the Region, to achieve the greatest results, Pasadena needs to partner with neighboring cities, transit agencies and state and federal government, and already is doing this on many initiatives. However, many of the recommendations in this chapter can be accomplished by Pasadena acting on its own. Figure 3-5 shows which of the strategies are entirely within Pasadena's hands and which absolutely require partnerships.

Figure 3-5 Recommended Strategies & Partnerships Required

	Traffic Reduction Strategies
Pasadena can implement on its own	Charge the right price for curb parking Return meter revenue to the neighborhoods that generate it Invest parking revenues in TDM programs Provide Universal Transit Passes (ARTS buses only) Require the unbundling of parking costs Require parking cash-out Strengthen TDM requirements Improve bicycle and pedestrian facilities and programs Remove minimum parking requirements Set maximum parking requirements
Pasadena needs partners	Provide Universal Transit Passes (Metro, Foothill Transit) Improve transit (Metro, Foothill Transit) Establish congestion pricing (waiver of state law required)

Where Are These Strategies Being Applied Already?

All of the transportation strategies recommended in this chapter have been implemented before. Nothing here is new or untested. In some cases, Pasadena already implements the strategy to some extent.

Many of the recommendations are included as key steps because they appeared, over and over, as important strategies in cities that have succeeded in reducing vehicle trips. (Most of these strategies are rarely seen in communities where traffic is getting steadily worse.)

Figure 3-6 summarizes many of the strategies used in ten of the case study cities that were reviewed for this report. The table reviews 16 possible strategies. Where a strategy is checked

off for a particular city, it indicates that the strategy is in widespread use in the area covered by the case study. Some of the strategies are used in virtually all of the communities.

All of these cities have priced parking (both meters at the curb in commercial areas, and priced parking at many workplaces and other destinations), and all use residential parking permit districts to prevent spillover parking problems. All have set low minimum parking requirements for many uses, except for the three (London, downtown Portland and downtown San Francisco) which have eliminated minimum parking requirements entirely. All except Vancouver have eliminated minimum parking requirements for at least some uses, and eight of the ten have set maximum parking requirements. Most, but not all, of the cities have some form of rail transit. Only two of the cities employ congestion pricing, but these two places are the ones that have achieved the most dramatic results in terms of traffic reduction.

One of the twelve recommended strategies, requiring parking cash-out, is not yet required by any of these cities, but it appears in the recommendations because of its success in other places. Successful car sharing operations exist in all of the cities: they succeed with little or no subsidy primarily as a *result* of the other policies in place - such as transit service and priced parking.

Overall, even a quick scan of this table suggests one conclusion. Although some of these places are midsized and mostly suburban American cities, while others are European capitals, there is a notable consensus on overall direction: the removal of parking subsidies, combined with improvements to all other modes of transportation.

Figure 3-6 Traffic Reduction Strategies in Ten Case Study Cities

Place	Parking Cash-Out Required	Congestion Pricing	Unbundling of Parking Costs Required	Universal Transit Pass Program	Parking Tax	Low Minimum Parking Requirements	Eliminated Minimum Parking Requirements	Set Maximum Parking Requirements	Priced Parking	Shared Parking/Park Once	Residential Parking Permit Districts	Carpool/Ride Matching Services	Car Sharing	Bicycle Parking Requirements	Rail Transit	Bus Rapid Transit
Arlington County, VA					✓	✓	✓		✓	✓	✓	✓	✓		✓	
Bellevue, WA (Downtown)			✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓		
Boulder, CO (Downtown)				✓		✓	✓		✓	✓	✓	✓	✓	✓		
Cambridge, MA						✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	
Lloyd District, Portland, OR				✓		✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	
London, Great Britain		✓					✓	✓	✓	✓	✓	✓	✓	✓	✓	
Portland, OR (Downtown)							✓	✓	✓	✓	✓		✓	✓	✓	
San Francisco, CA (Downtown)			✓		✓		✓	✓	✓	✓	✓	✓	✓	✓	✓	
Stockholm, Sweden		✓			✓	✓	✓	✓	✓	✓	✓		✓	✓	✓	✓
Vancouver, B.C.				✓	✓	✓		✓	✓	✓	✓	✓	✓	✓	✓	✓

Twelve Recommendations

For the sake of brevity, each of the recommendations that follow is limited to two pages of explanation and most fit on one page. For each of the recommended strategies, a fuller description, along with references, is provided in the Appendix B, Traffic Reduction Strategy Sheets. The case study chapters in Appendix A add more detail, explaining how the strategies are currently being used in the cities studied.

Recommendation 1: Charge the right price for curb parking

Charge the lowest price that will leave one or two vacant spaces on each block -- that is, performance-based pricing. This will eliminate the traffic congestion caused by drivers cruising for parking.

One source of excess traffic in Pasadena (as in many other cities) is cruising for parking, that is, people searching and circling to find a free or below market-rate curb parking space. The previous chapter of this report discusses the problem at length. Cruising for parking adds more traffic to an already congested street network. In these circumstances, managing parking prices to ensure that there are available curb parking spaces at all times of day is an important strategy for reducing traffic. Making sure that there are curb parking spaces available, using parking prices rather than relying on minimum off-street parking requirements, is also a fundamental first step that makes possible the implementation of many of the powerful traffic reduction strategies described later.

Parking meters are already in place in several of Pasadena's central districts, and past surveys indicated that at least in the Old Pasadena parking meter zone, the parking rates and hours in effect were achieving an overall 86% occupancy rate, or essentially optimal parking occupancies for preventing cruising traffic while still making good use of the parking supply and attracting customers. By charging for curb parking late into the evening and even on Sundays -- something that many other large cities fail to do, even when a district has very high demand for parking at these hours – Old Pasadena has been in many ways a model of preventing cruising for parking.

However, under current policies, parking meter locations, rates and hours of operation are not specifically set to maintain an optimal number of vacancies and prevent cruising traffic, as a citywide policy. Even in Old Pasadena, City staff has observed that the parking occupancies are near 100% in the very dense areas at many times - and when occupancies reach this level, studies have found that a significant share of traffic on a street will be cruising for parking. Especially on Colorado Blvd., it would be common for motorists to cruise and make U-turns in search of a space.

In parts of Pasadena outside of Old Pasadena, such as the Playhouse District (where offstreet garages have a price and on-street parking is free) it is likely that cruising traffic is also occurring. The proposed addition of parking meters to this area (with return of the net revenues to the Playhouse District) is a positive step forward for reducing traffic congestion. Another recent positive step toward eliminating the problem of cruising traffic is the City's tests of new meter technologies, such as the multi-space meters used in a Pasadena pilot program, which would allow Pasadena to much more easily monitor parking occupancy and adjust prices. The technology makes it easy for the City to move past conventional parking meters and management methods that use inflexible flat hourly pricing and time limits, regardless of demand patterns which vary substantially by block and by time of day. Many other cities have had good results with these multi-space meters with adjustable time-of-day and day-of-week prices.

As citywide policy, the following policies for the pricing of on-street parking can effectively eliminate the excess traffic created by drivers cruising for parking:

1. **Set a policy goal of keeping occupancy rates at an optimal 85% (so that 1 in 8 spaces, or about one per block, will always be available).** This rate is a widely-accepted industry standard that provides a high level of convenience for parkers and largely eliminates the circling for parking which contributes to increased driver frustration, traffic congestion and collisions. This policy will also ensure turnover of the most convenient curb-parking spaces and availability for customers, particularly where there are concentrations of ground floor retail businesses (This latter goal is already set forth in Pasadena's Mobility Element.)
2. **Grant staff authority to adjust hourly rates based on Council-adopted optimum occupancy standard (85%).** In order for fair market rate pricing to be effective, staff need to be able to respond quickly when occupancy rates dip well below or go over the optimal standard (85% of stalls occupied), rather than having every adjustment to prices be a lengthy political event. Under this policy, Council sets the overall goal and then delegates to staff the responsibility of achieving that goal.
3. **Plan regular occupancy checks and adjust rates.** Make occupancy checks and rate adjustments (if necessary) at a minimum on a quarterly basis. With some of the new meter technologies, the City can have the capability to monitor hour-by-hour occupancy.

Redwood City, CA is the first city in the United States to have implemented a zoning ordinance that follows the parking management principles described above. In order to secure and maintain the support of the downtown merchants and employers for this policy, Redwood City's ordinance (inspired by Old Pasadena's successful use of the same approach) requires that all net revenue from the parking meters be spent on public improvements that benefit the Downtown Meter Zone.

As demonstrated by the success of old Pasadena's parking meter zone, charging for on-street parking according to the 85% target occupancy principle will not drive customers away. Under the policy, if rates are set too high, so that too many spaces are empty, the policy requires adjusting rates downward until the parking spaces are again well-used by customers.

Recommendation 2: Return the meter revenue to the neighborhoods that generate it

Revenue return will make performance-based prices for curb parking politically popular.

A. Create additional Commercial Parking Benefit Districts, modeled after the Old Pasadena Parking Meter Zone.

Net revenues from paid parking at the curb should fund public improvements that benefit the blocks where the money is collected. ("Net revenues" means total parking revenues from the area, less revenue collection costs, such as purchase and operation of the meters, enforcement and the administration of the district.) If parking revenues seem to disappear into the General Fund, where they may appear to produce no direct benefit for the District where they are collected, there will often be little support for installing parking meters, or for raising rates when needed to maintain decent vacancy rates and prevent cruising traffic. But when District merchants and property owners can clearly see that the monies collected are being spent for the benefit of their blocks, on projects that they have chosen, they become willing to support market rate pricing.

In Old Pasadena, the City created a Parking Benefit District and chose to return all meter revenues collected from the District back to it in the form of public improvements. The resulting improvements to the streetscape, including conversions of its alleys into walkways with access to shops and restaurants, have transformed the district into a vital shopping, dining and entertainment area. The choice to fund local improvement in this district benefited the City of Pasadena by vastly increasing property values and resulting property tax revenues. The political wisdom of returning meter revenues to the blocks where it is collected was demonstrated just this year. As Pasadena's Parking Manager points out, when raising meter rates in Old Pasadena to up to $1.25 per hour was proposed, some merchants were initially opposed. However, the majority changed their views after realizing that the additional revenues would be pumped right back into the district.

Returning meter revenues is an important technique in many of the case study cities as well. In Boulder, Colorado, all downtown parking meter revenue -- more than $1 million per year -- is returned to the Downtown's business improvement district. Among other things, the revenue is used to fund more than $325,000 per year worth of transportation demand management programs, including a free universal transit pass for all downtown employees, a Guaranteed Ride Home program, ride-matching services, bicycle parking and a number of other benefits.

In Portland, Oregon's Lloyd District, revenue from the district's meters is given to the district's Transportation Management Association, providing the funding needed to support the district's universal transit pass program and transportation demand management program for its member employees.

There are two primary reasons for a Parking Benefit District to be considered a traffic reduction strategy: first, it generates revenue to support transportation demand management programs and/or to improve the pedestrian environment; and equally importantly, it generates the political support required to maintain a policy of pricing parking at rates high enough to eliminate the problem of cruising traffic. In addition, the parking price itself reduces the hidden subsidy to auto use and this helps to make travel alternatives – transit, carpools, bicycling and walking – relatively more attractive.

B. Establish Residential Parking Benefit Districts.

At the same time as Commercial Parking Benefit Districts, with prices set to maintain one or two vacancies on each block, are implemented for primarily commercial areas, Residential Parking Benefit Districts should be implemented in residential areas, wherever there is the potential for spillover parking from nearby commercial areas, and wherever densities are high enough that the on-street parking might fill up if left unmanaged. Residential Parking Benefit Districts are similar to Pasadena's existing residential parking permit districts, but can also allow a limited number of commuters to pay to use surplus on-street parking spaces in the residential areas, and then return the resulting revenues to the neighborhood to fund public improvements.

In order to prevent spillover parking in residential neighborhoods, many cities including Pasadena implement *residential parking permit districts* (formally known in Pasadena as Preferential Parking Districts) by issuing a certain number of parking permits to residents, usually for free or a nominal fee. These permits allow the residents to park within the district while all others are prohibited from parking there for more than a few hours, if allowed at all.

A fundamental flaw with many conventional residential permit districts is that they often issue an unlimited number of permits to residents without regard to the actual number of curb parking spaces available in the district. This leads to a situation in which on-street parking is seriously congested, and the permit functions solely as a "hunting license", simply giving residents the right to hunt for a parking space with no guarantee that they will actually find one. An example of this is Boston's Beacon Hill neighborhood, where the City's Department of Transportation has issued residents 3,933 permits for the 983 available curb spaces in Beacon Hill's residential parking permit district, a 4-to-1 ratio.

To avoid these problems, Residential Parking Benefit Districts, using the following policies, should replace existing preferential parking districts. This will prevent excessive spillover parking from commuters trying to avoid parking charges and ensure that on each block, at least one or two vacant spaces are always available:

1. Limit the number of permits issued to a number that results in a peak hour occupancy of 85% or less, as determined by periodic surveys. *Existing* residents could be issued a certain number of free permits, but for *future* residents, permits should be sold at whatever rate is required to balance the demand for permits with the actual supply of curb parking spaces.
2. Rather than entirely prohibit nonresident parking, sell permits for any surplus parking capacity to non-resident commuters at fair market rates, up to 90% of available parking supply. Do this only where a vote of the neighborhood shows approval of the concept.
3. Dedicate all net permit revenues to pay for public improvements in the neighborhood where the revenue was generated. Give residents a strong voice in deciding how the money is spent.

As an example, Boulder, CO, operates Residential Parking Benefit Districts. Boulder sells permits to residents for $17 per vehicle per year, permits for businesses located within a zone for $75 per year and commuter permits for $78 per quarter ($312 per year). Each permit is valid on a specific block and a maximum of four non-resident permits are issued on any given block face within a zone, and only if the vacancy rate is greater than 25% during daytime. The program is currently revenue neutral with all revenue from nonresident permits being used to reduce the price of the resident permits. For areas with higher parking demand than in Boulder, the revenues generated for a neighborhood could be significantly higher, however.

Recommendation 3: Invest a portion of parking revenues in transportation demand management programs

In Commercial Parking Benefit Districts, invest parking revenues in a full spectrum of transportation demand management strategies for employees and residents, including transit, carpool, vanpool, bicycle and pedestrian programs. Invest in the most cost-effective mix of transportation modes for access to the District, including both parking and transportation demand management strategies.

The cost to construct new parking garages in many parts of Pasadena can be expected to be approximately $30,000 per space gained, resulting in a total cost to build, operate and maintain new spaces of approximately $180 per month per space, every month for the expected 40 year lifetime of the typical garage. (Given land values, the opportunity cost of using surface land for parking can be even higher.) These dismal economics for parking garages lead to a simple principle: it can often be cheaper to reduce parking demand than to construct new parking.

By investing in demand-reduction strategies, many Pasadena districts can expect to cost-effectively reduce parking demand (and the resulting traffic loads) by one quarter to one third or more.

Case Study: Boulder, Colorado

An excellent example of a Parking Benefit District that funds transportation alternatives is the City of Boulder (Colorado). The responsibilities of Boulder's Central Area General Improvement District (CAGID) include:

- Analyzing most cost-effective mix of new parking or transportation alternatives
- Management and construction of all public parking downtown
- Provide a broad array of transportation demand management programs and incentives including the following commuter benefits: a free universal transit pass (Eco-Pass); ride-matching services; bicycle parking and rentals

In addition, CAGID also funds the operation of a "Transportation Resource Center" in a downtown storefront. All of these programs are funded by a $325,000/year budget, funded by $1 million in meter revenue that is transferred to CAGID via a Parking Benefit District mechanism. As documented in the case studies, Boulder's efforts are achieving remarkable results.

Case Study: Portland's Lloyd District

Portland's Lloyd District is another excellent example of using meter revenue to fund sophisticated transportation demand management programs, including a universal transit pass program for thousands of employees. Thanks in good part to this program, transit mode share has doubled.

Recommendation 4: Provide Universal Transit Passes

In recent years, growing numbers of transit agencies have teamed with universities, employers, or residential neighborhoods to provide universal transit passes. These passes typically provide unlimited rides on local or regional transit providers for low monthly fees, often absorbed entirely by the employer, school, or developers. The principle of employee and residential universal transit passes is similar to that of group insurance plans – transit agencies can offer deep bulk discounts when selling passes to a large group, with universal enrollment, on the basis that not all those offered the pass will actually use them regularly. A review of existing programs found that the annual per employee fees are generally between 1% and 17% of the retail price for an equivalent annual transit pass.

An excellent example of a universal transit pass is the Eco-Pass program in downtown Boulder, which provides free transit on Denver's Regional Transportation District (RTD) light rail and buses to more than 8,300 employees, employed by 1,200 different businesses in downtown Boulder. To fund this program, Boulder's downtown parking benefit district pays a flat fee for each employee who is enrolled in the program, regardless of whether the employee actually rides transit. Because every single employee in the downtown is enrolled in the program, the Regional Transportation District in turn provides the transit passes at a deep bulk discount. The cost per employee per year is $83, which is less than 6% of the cost of an equivalent annual ValuPass ($1,485 per year). As described in the case studies, in Bellevue, WA, and Portland, OR, programs offer similar universal transit pass programs.

As is further described in Appendix B, Los Angeles Metro has recently introduced two employer/institution-based universal transit pass programs. The *B-TAP* (Business Transit Pass) is designed for businesses, and the *I-TAP* (Institutional Transit Pass) is available to larger organizations such as colleges, universities and trade schools. Unfortunately, the current cost of the annual B-TAP pass is 15-31% of a regular annual pass, which may discourage participation. By contrast, Boulder's and Santa Clara VTA's universal transit passes cost less than 10% of the regular annual transit pass price. Metro is currently investigating the possibility of including other LA-based transit agencies into its universal transit pass program, similar to its EZ Pass program which covers more than 20 transit agencies throughout the Greater Los Angeles Region. Universal transit passes are usually extremely effective means to reduce the number of car trips in an area, as shown in Figure 3-7.

Figure 3-7 Effects of Universal Transit Pass Introduction

Location	Drive to work		Transit to work	
Municipalities	Before	After	Before	After
Santa Clara (VTA)	76%	60%	11%	27%
Bellevue, Washington	81%	57%	13%	18%
Ann Arbor, Michigan	N/A	(4%)	20%	25%
Downtown Boulder, Colorado	56%	36%	15%	34%
Universities				
UCLA (faculty and staff)	46%	42%	8%	13%
Univ. of Washington, Seattle	33%	24%	21%	36%
Univ. of British Colombia	68%	57%	26%	38%
Univ. of Wisconsin, Milwaukee	54%	41%	12%	26%
Colorado Univ. Boulder (students)	43%	33%	4%	7%

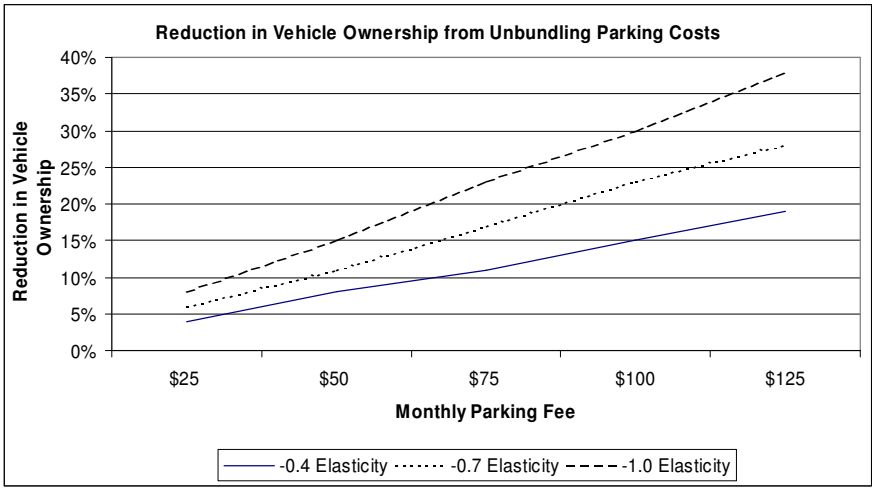
Recommendation 5: Require the unbundling of parking costs

Parking costs are frequently subsumed into the sale or rental price of housing and commercial space in California, for the sake of simplicity and because that is the more traditional practice in real estate. But although the cost of parking is often hidden in this way, parking is never free, and hiding its cost results in higher vehicle ownership and more traffic. To reduce traffic, the full cost of parking should be "unbundled" from the cost of multifamily housing units (both rental and condominium); commercial space; and from the costs of other goods and services, with limited exceptions. As described in the case studies and in the Traffic Reduction Strategy Sheet on unbundling parking, there are several excellent examples of unbundling parking costs. Here are two:

Unbundling parking costs from commercial space in Bellevue, WA: Transportation researcher Todd Litman reports that Bellevue "requires building owners to include parking costs as a separate line item in leases and to charge a minimum rate for monthly long-term parking that is equal or greater than the cost of a bus pass. This makes it easier for employers to determine the value of their current parking subsidies [when employers are establishing employee parking charges or parking cash-out programs]." Additionally, this policy means that employers who successfully reduce parking demand and traffic to their worksites are able to reap financial benefits by leasing fewer parking spaces.

Unbundling parking costs from housing costs in San Francisco: San Francisco enacted a new zoning ordinance in 2006 affecting downtown commercial and residential zones (DTR and C-3 Districts) which requires the unbundling of parking costs in all residential structures over ten dwelling units. Charging separately for parking is perhaps the single most effective residentially-based strategy to encourage households to own fewer cars, and rely more on walking, cycling and transit. According to a study by Todd Litman (2004), unbundling residential parking can significantly reduce household vehicle ownership and parking demand. These effects are presented in Figure 3-8.

Figure 3-8 Vehicle Ownership and Unbundling Parking Costs



Unbundling parking costs from other costs: parking costs can also be unbundled from the price of many other goods. The Getty Museum, for example, does not subsidize parking, charging $5 per day, but does subsidize culture, by providing free entry to the museum.

Recommendation 6: Require Parking Cash-Out

Require all new and existing employers that provide subsidized employee parking to offer their employees the option to "cash out" their parking subsidy.

The majority of all employers provide free or reduced price parking for their employees as a fringe benefit. Under a parking cash out requirement, employers are allowed to continue this practice *on the condition that they offer the cash value of the parking subsidy to any employee who does not drive to work*. The primary benefit of parking cash out programs is their proven effect on reducing auto congestion and parking demand.

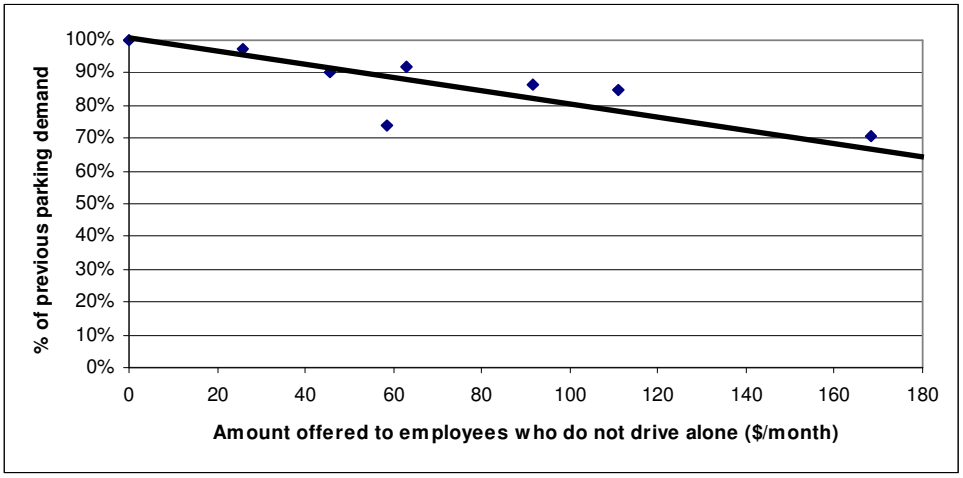
Other benefits of parking cash out are numerous, and include:

- Provides an equal transportation subsidy to employees who ride transit, carpool, vanpool, walk or bicycle to work.
- Provides a low-cost fringe benefit that can help individual businesses recruit and retain employees.
- Employers report that parking cash-out requirements are simple to administer and enforce, typically requiring just one to two minutes per employee per month to administer.

Since 1996, the City of Santa Monica has required all employers subject to Calfiornia's parking cash out law include parking cash out as part of their trip reduction plan. Santa Monica requires proof of compliance with the State of California's parking cash out law before issuing occupancy permits for new commercial development.

Figure 3-9 illustrates the effect of parking cash-out at seven different employers located in and around Los Angeles. It should be noted most of the case study employers are located in areas that do not have good access to transit service, so that a large part of the reduced parking demand and driving to work that occurred with these parking cash out programs resulted when former solo drivers began carpooling.

Figure 3-9 Effects of Parking Cash-Out on Parking Demand



Effects of parking cash-out on parking demand. Source: Derived from Donald Shoup, "Evaluating the Effects of Parking Cash-Out: Eight Case Studies," 1997. Based on the cost in 2005 dollars.

Recommendation 7: Strengthen transportation demand management requirements

Strengthen Pasadena's existing transportation demand management requirements, programs and services, both by asking more of employers and by providing additional public resources and staff attention.

In many ways, this recommendation overlaps with previous recommendations, such as devoting a portion of parking meter revenues to transportation demand management programs, enrolling employees and residents in universal transit pass programs, unbundling parking costs, and so on. These previously described strategies should be part of strengthened TDM requirements. However, additional techniques that have not been mentioned so far can include:

Trip Reduction Ordinances: In two of the successful case study cities, Bellevue, WA and Cambridge, MA, strong trip reduction ordinances have had a significant impact on drive-alone rates. Cambridge, for example, requires all new and expanding non-residential developments to implement a plan to reduce auto use to 10% below the average for that census tract, with real penalties if targets are not met. Downtown Bellevue worksites enrolled in its Commuter Trip Reduction program reduced drive alone rates from 72.9% to 58.5% - a 20% decrease.

Supporting Car-Sharing: Car-sharing provides individuals with access to a fleet of shared vehicles, allowing them to avoid owning a car, or a second or third car. Pasadena can step up efforts to attract car-sharing through several mechanisms:

- Establish car-sharing through new development. Require new developments to provide parking and subsidize start-up costs. Typically, a $1,200 to $1,500 monthly revenue guarantee would be required, with the developer making up any shortfall in user fees. Car-sharing can be implemented on a case-by-case basis or, as in San Francisco, formalized in a zoning code.

- Replace vehicle fleets. A public agency or large employer could reduce or eliminate its fleet of pool cars, and allow employees to use car-sharing instead. This would provide a guaranteed level of baseline use, and enable residents and other employees to use the cars in the evenings and weekends. Philadelphia and Berkeley provide good examples; Philadelphia projects savings of $9.1 million over five years through replacing 500 City-owned vehicles with car-sharing.

- Provide marketing support and other incentives. Should a car-sharing program be established, towns and cities can assist with marketing, and promote the service through Transportation Demand Management programs. They can also provide car-sharing operators with parking spaces.

Recommendation 8: Improve transit

To reduce traffic, further investments in transit are a key strategy. If the City of Pasadena employees the demand management techniques recommended elsewhere, such as Universal Transit Passes, parking cash out programs and/or congestion pricing, people will have greater need for - and there will be riders for - an excellent transit network that can better compete with driving. Both London's and Stockholm's congestion charging schemes are heavily supported by investments in transit. Major improvements were carried out in advance of the introducing congestion pricing, and are now accompanied by even more improvements, financed by charging scheme revenues, which will improve the transit network even further.

Transit service can be expanded and improved in several ways, for instance by improving:

- Frequency
- Reliability
- Travel time
- Hours of operation
- Service and comfort

Perhaps most promisingly for Pasadena, transit can also be improved by adding a completely new route or a new type of service, such as Bus Rapid Transit (BRT). BRT is defined as, "a flexible, rubber-tired rapid-transit mode that combines stations, vehicles, services, running ways, and Intelligent Transportation System (ITS) elements into an integrated system with a strong positive identity that evokes a unique image." In short, BRT uses various tools (dedicated running ways, longer inter-station distances, off-vehicle fare collection, ITS, "clean" vehicles, frequent service) to produce a fast and convenient method of transportation.

It has often been described as a rubber-tired version of light-rail transit (LRT). However, it differs in frequently having much lower capital and operating costs. BRT also stands in contrast to buses as a speedier, more reliable, and easily identifiable alternative. The advantages of BRT are:

- Cost. In deciding to construct a rapid transit system in 1976, Ottawa opted for BRT after it was discovered capital costs would be half those of rail transit and 20% cheaper to operate. It should also be noted that BRT operating costs can be the same or less per passenger trip than LRT.
- Travel Times. BRT time savings are influenced by the design of the system. Buses operated on dedicated running ways save between two to three minutes per mile while those same vehicles driven on arterial streets normally save one to two minutes per mile when compared to regular bus lines. Greater time savings are made during peak congested hours – Pittsburgh's BRT line reports a time savings of five minutes per mile during peak hours.

Comprehensive improvements, such as Light Rail or Bus Rapid Transit systems, can provide large increases in transit use and attract large numbers of discretionary riders who would otherwise travel by automobile. Various cities have seen increases in bus ridership with the introduction of BRT service – Pittsburgh (38%), Los Angeles (40%), Brisbane (42%), Adelaide (76%), Leeds (50%). Impacts of other expansions in transit vary depending on the conditions in which it is implemented (VTPI).

As a local example of quickly deployed investment in transit, it is worth noting the success of the Los Angeles Metro Rapid Program - a partial implementation of bus rapid transit - as described in the case study on it. According to the Federal Transit Administration, the Metro Rapid program has created an express arterial bus service that has reduced passenger travel times by as much as 29%, with ridership increases of nearly 40%. Approximately one third of the reduction in travel time results from the bus signal priority system, with the majority of the balance attributed to fewer stops and headway-based schedules. The first MetroRapid line through Pasadena is the MetroRapid Line 780, running on Colorado Boulevard. Pasadena is already working to speed up and approve this line by installing signal prioritization for it. Next, slated to open in June, 2007, the new MetroRapid Line 762 will serve Fair Oaks Avenue and intersects Line 780 at the Memorial Park rail station.

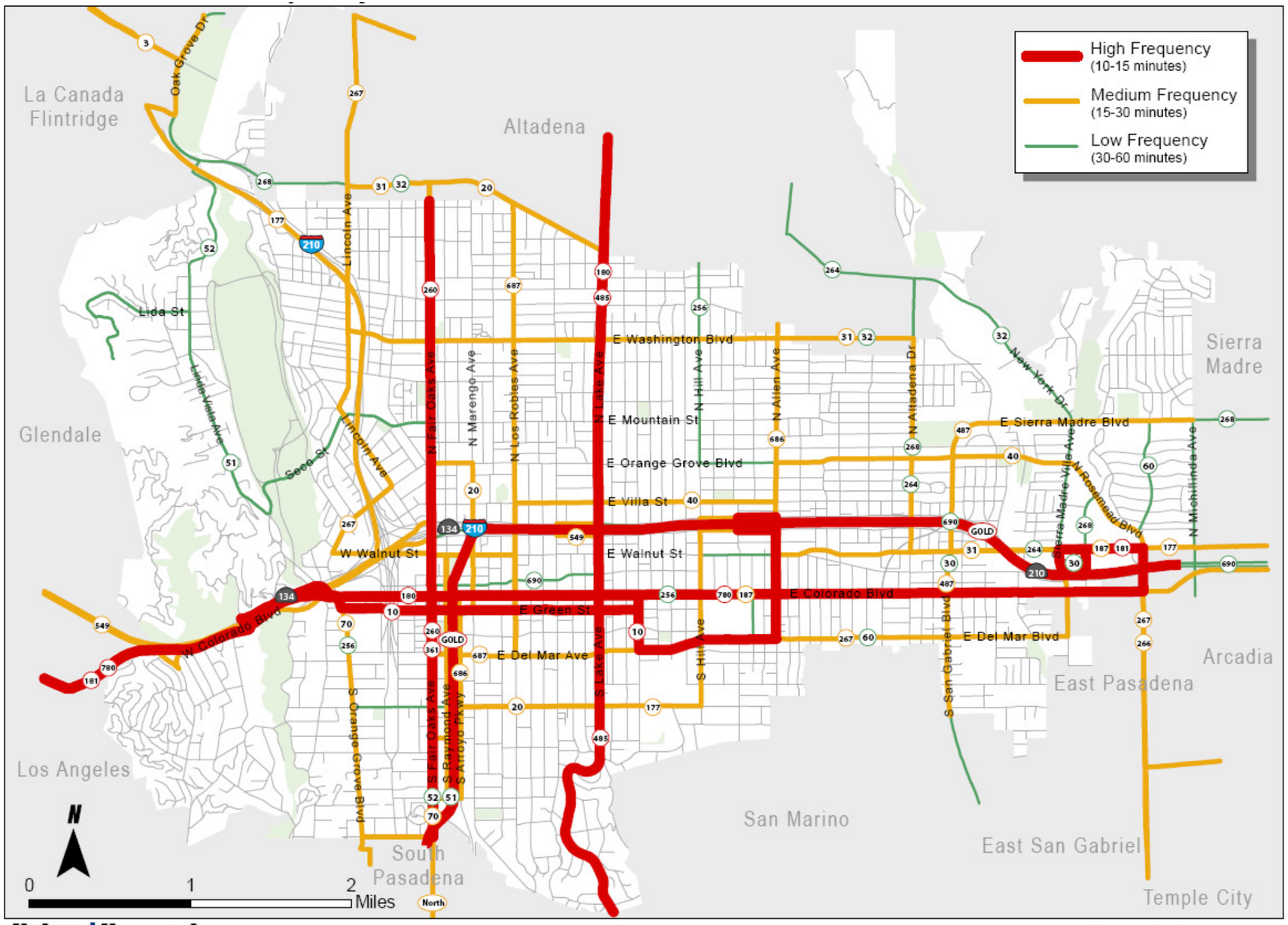
A Primary Transit Network for Pasadena

Future investments in transit in Pasadena need to be focused and supported by street designs that work well with transit. Dense, transit-oriented development is already on the Pasadena agenda and market, and General Plan policies recommend additional housing along commercial corridors where it can be linked with transit. To serve all of this new development, to make it genuinely transit-oriented, a fast, frequent and reliable transit network is needed. This suggests the concept of a Primary Transit Network that will be the backbone of the City's transit system and carry its highest concentrations of transit trips.

A Primary Transit Network should consist of transit lines that operate every 15 minutes or better all day. A 15-minute headway represents the point at which a transit rider no longer needs to consult a schedule to use the service. It also permits transfers to be made rapidly even without timing of connections. For these reasons, the threshold frequency of 15 minutes is the point at which the benefits of transit tend to grow exponentially. The transit network in Boulder, Colorado, as described in its case study, has achieved soaring transit ridership by ensuring this frequency of service, despite the city's low density. On the streets that form the Primary Transit Network, improvements should be made over time to the streets to let transit move faster, more reliably and more comfortably. Eventually, some of these routes should become full Bus Rapid Transit lines.

Figure 3-10 and Figure 3-11 illustrate existing bus service lines in Pasadena, coded by frequency of service. To emphasize the high-frequency routes, Figure 3-10 places the highest frequency routes (the red lines) on the top layer. To show how many routes use on important transit streets like Fair Oaks and Colorado, Figure 3-11 shows the overlap of all routes. Essentially, portions of a Primary Transit Network exist today, in the form of streets (such as Colorado Blvd, Lake Avenue and Fair Oaks Avenue) that already carry transit routes with combined frequencies meeting this standard. On streets like these, the challenge is to make transit move faster and cut through congestion. Making specific recommendations about transit improvements on particular streets in particular bus lines is beyond the scope of the study. These maps, however, together with the case study chapters describing other cities' experience with transit improvements, are intended to provide a thought-provoking overview of the possibilities.

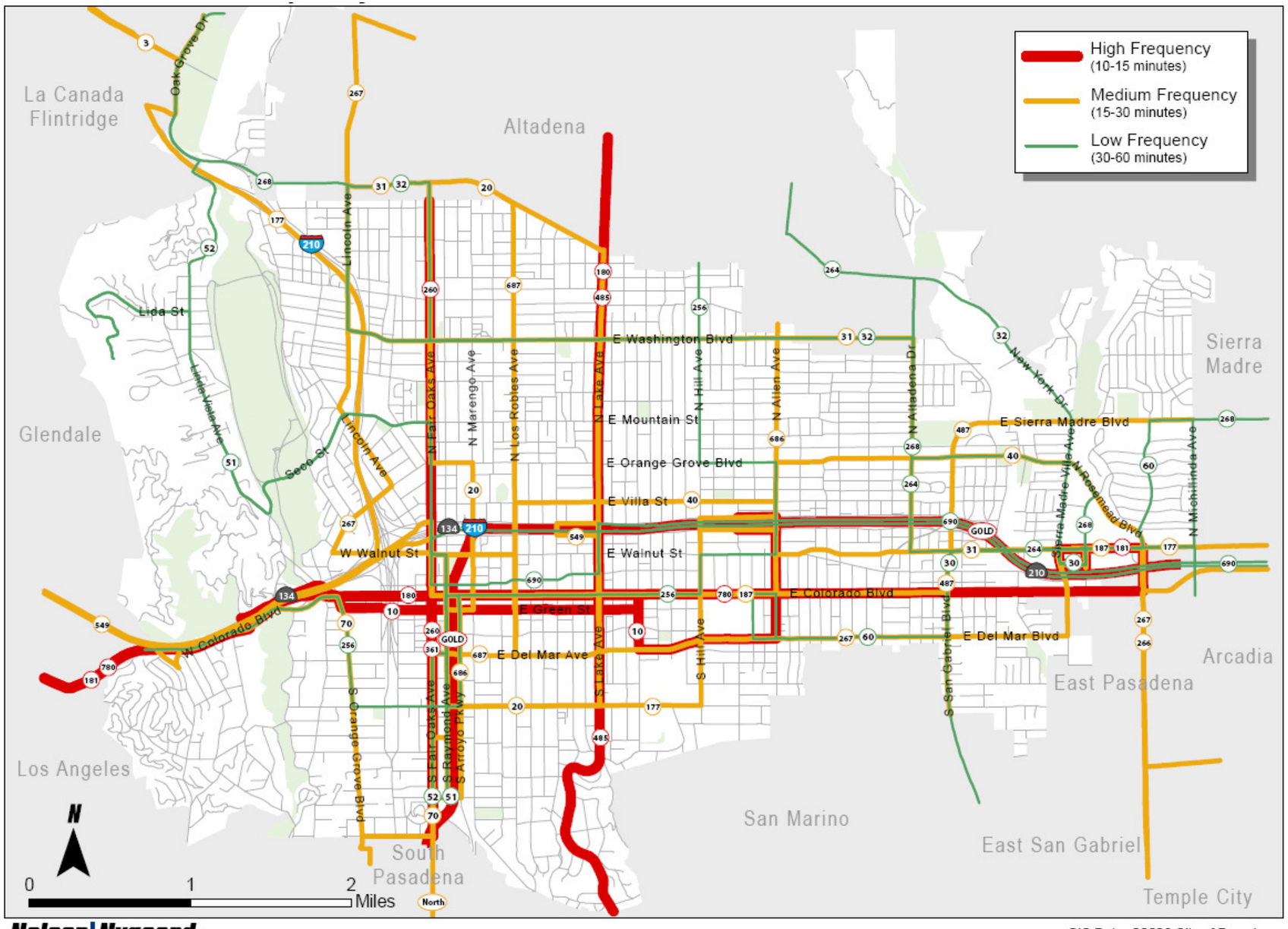
Figure 3-10 Pasadena Transit Frequency, Focus on Major Corridors



Nelson\Nygaard consulting associates

GIS Data: ©2006 City of Pasadena

Figure 3-11 Pasadena Transit Frequency, All Existing Routes



Nelson|Nygaard consulting associates

GIS Data: ©2006 City of Pasadena

Recommendation 9: Improve bicycle and pedestrian facilities and programs

Although bicycling and walking rates in Pasadena are still modest, compared to some California college towns, such as Davis, Palo Alto and Berkeley, Pasadena residents already bike and walk to work at rates double the national average. Recently, Pasadena expanded the bikeway network with 50 miles of additional bike lanes, enhanced bike routes, and standard bike routes. Bike parking has been increased throughout the City with the installation of 200 new bike racks. Additional efforts to expand bicycle parking in the twelve public parking facilities are underway throughout Pasadena as part of the City's Bikeway Program.

The Mobility Element describes many further potential improvements, as do Pasadena's Bicycle and Pedestrian Master Plans. Many of the other recommendations in this chapter will both increase demand for bicycling and walking facilities and will have greater effect if excellent facilities to welcome new cyclists and pedestrians are in place. These plans should be fully implemented.

For pedestrian facilities, specific research tying the construction of individual pedestrian facilities to increased walking rates is difficult to find, but their utility, both for those making walking trips and those walking to the transit stop, is clear.

Regarding the effectiveness of improving cycling conditions in particular, several before-after studies of bicycle facility implementation have been conducted in recent years:

- According to Nelson and Allen (1997), each mile of bikeway per 100,000 residents increases bicycle commuting 0.075 percent, all else being equal.
- Dill and Carr (2003) states that for U.S. cities with more than 250,000 residents, each additional mile of bike lanes per square mile is associated with a roughly one percentage point increase in bicycle commute mode share.
- To mention one example from our case study cities, in March 1999, bike lanes were striped along Valencia Street in San Francisco, changing the street from four-lanes to two-lanes with bike lanes and a median lane for left turns. Bicycle usage on Valencia Street increased 144 percent during the PM peak hour and motor vehicle traffic dropped by 10 percent and redistributed to parallel arterials (San Francisco Department of Parking and Traffic, 2001). Striping of bike lanes and removal of a travel lane along Polk Street in San Francisco increased bicycle ridership by 41% in the AM peak hour and 28% in the PM peak hour. Bicycle facilities are a critical part of future development and the existing bicycle network. They allow easy access for residents and visitors to and from destinations and transit hubs. Trips with distance between one and two miles make up a long walk, but a brief bicycle ride.

Bicycle Stations: As other measures in this chapter increase demand for transit, many Gold Line stations will become suitable for a bicycle station. Bicycle stations offer secure bike storage and typically offer bicycle rental, repairs and information. Designed well, they have been shown to dramatically expand the "catchment area" of a transit station by removing a key obstacle to increased bicycle use, the fear of having a bike damaged by weather or vandalism, or stolen. Bicycle stations operate at rail stations throughout the US, including the Palo Alto Caltrain Station, Embarcadero and Berkeley BART stations, Long Beach Blue Line station in California; Pioneer Square Tunnel Station in Seattle; and Millennium Park in Chicago.

Recommendation 10: Remove minimum parking requirements for off-street parking

All minimum parking requirements in Pasadena should be removed.

As described in Chapter 2, Pasadena's minimum parking requirements were adopted to "alleviate or prevent traffic congestion and shortages of curbside parking spaces". In many parts of Pasadena, minimum parking requirements have succeeded in preventing shortages of curbside parking spaces, but that they have played a powerful role in increasing the number of vehicle trips on Pasadena streets and worsening traffic congestion throughout the City.

Minimum parking requirements worsen traffic congestion through a simple three step process:

4. Minimum parking requirements are set high enough to provide more than enough parking even when parking is free, even at isolated suburban locations with little or no transit.
5. Parking is then provided for free at most destinations, and its costs hidden.
6. Bundling the cost of parking into higher prices for everything else skews travel choices toward cars and away from public transit, cycling and walking. As shown in the tables on parking price versus drive alone rates in Chapter 2 (see Figure 2-4), this effect is powerful.

Once the first two recommendations in this chapter - setting prices for curb parking that ensure at least one or two vacancies per block, and returning the resulting parking revenue to the neighborhood where it is generated - are fully implemented, off-street minimum parking requirements are no longer needed to prevent shortages of on-street parking. Instead, they only act to worsen traffic, and to discourage developers, employers, residents and other property owners from implementing strategies that reduce traffic and parking demand.

As shown in the chart comparing policies in the various case study cities (see Figure 3-6), virtually all of these communities have eliminated minimum parking requirements in the places where they have successfully reduced traffic. The cities with the strongest records of reducing vehicle trips and traffic congestion, such as London, have eliminated minimum parking requirements entirely. The great majority of these cities instead now have *maximum* parking requirements (that is, they limit the number of spaces allowed at each building). They now regard maximum parking requirements - the opposite approach - as an essential tool for preventing traffic congestion.

As Professor Donald Shoup describes the situation:

> A few American cities - Boston, New York, and San Francisco - do limit parking in their downtowns, but even these cities require parking everywhere else. If parking caps *reduce* vehicle trips, parking requirements surely *increase* them. If we want to reduce traffic congestion, energy consumption, and air pollution, the simplest and most productive single reform of American zoning would be to declare that all the existing offstreet parking requirements are maximums rather than minimums, without changing any of the numbers, just as the London Borough of Kensington and Chelsea did in 1995.

Recommendation 11: Set maximum parking requirements

To reduce vehicle trips and congestion, set maximum parking requirements for Pasadena districts that limit the supply of parking to available road capacity.

As described earlier, most of the case study cities - at least eight out of ten - employ *maximum* parking requirements, rather than minimum parking requirements, to successfully reduce traffic congestion. Pasadena also now employs maximum parking requirements in its transit oriented development zones.

Maximum parking requirements generally alleviate traffic congestion and reduce auto use through a simple three step process:

4. Maximum parking requirements are set low enough to so that if parking at a location is given away for free, there will be a shortage.
5. Parking at these locations is then provided to the people who use it for a price that covers at least part of its costs, so that parking's cost is revealed. Alternately, employers and other parking providers need to provide strong subsidies for alternative transportation (such as free transit passes or a parking cash out program), to avoid a shortage while remaining popular with their drivers.
6. Removing parking subsidies (or providing equally strong subsidies for other modes) then brings travel choices back into balance, toward public transit, cycling and walking. Again, as shown in the tables on parking price versus drive alone rates in Chapter 2 (see Figure 2-4), this effect is powerful.

As with removing minimum parking requirements, the first two recommendations in this chapter - setting prices for curb parking that ensure at least one or two vacancies per block, and returning the resulting parking revenue to the neighborhood where it is generated - need to be implemented, in order to prevent shortages of on-street parking when maximum parking requirements are set.

According to Davidson & Dolnick (2002) parking maximums are in force in many cities around the United States, including Cambridge, MA; Gresham, OR; Helena, MT; Jefferson County (Louisvillle), KE; Pittsburgh, PA; Redmond, WA; San Antonio, TX; San Francisco, CA and Seattle, WA. As one example from the case studies, in several parts of Portland, OR, the minimum parking requirements have been completely removed and are instead used as maximums. For example, Pasadena's downtown parking maximum for new office is 2.7 spaces per 1,000 square feet, whereas Portland's downtown the maximum is one space per 1,000 square feet.

Recommendation 12: Establish congestion pricing

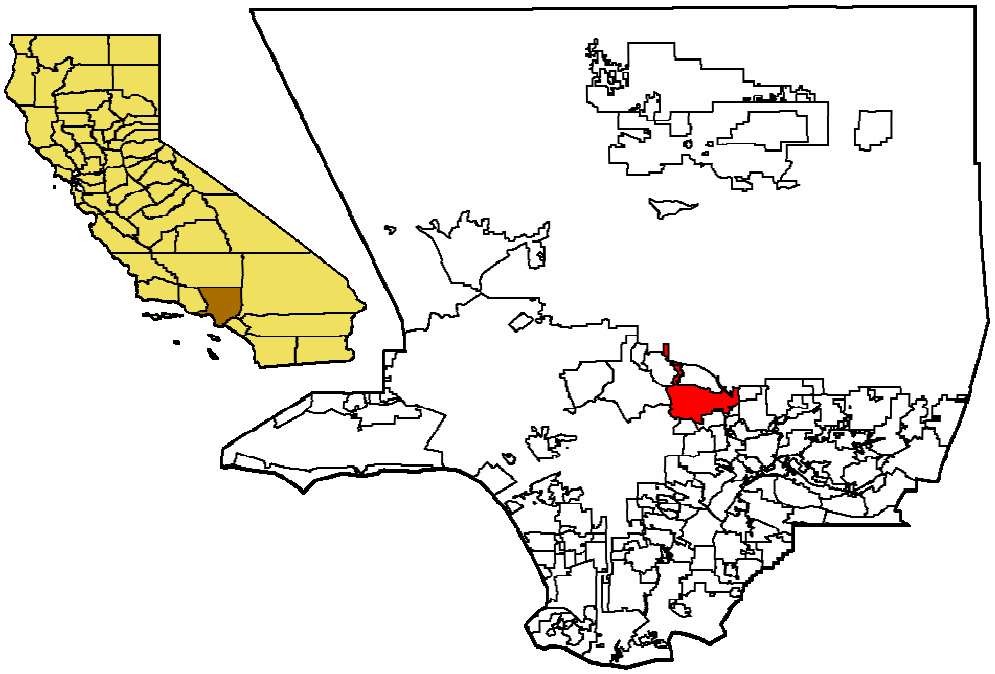
As is described at length in the case studies, establishing congestion pricing is the most powerful single technique for ensuring traffic reduction. For pass-through trips (that is, trips with neither origin nor destination in Pasadena) on Pasadena streets, it is almost certainly the only truly effective remedy, the only one that can guarantee a decline in this type of trips. Two of the case studies demonstrate the efficacy of congestion pricing:

London: Congestion delays dropped 26% since 2003 from 2.3 to 1.8 minutes per kilometer. Figures from 2005 show a 17% decrease in total traffic with a 31% drop in potentially-chargeable vehicles entering the zone. From 2002 to 2005, the total number of car "vehicle-kilometers driven" fell 39%. The fee is not considered to be a perfect solution due to it not being time or location-variable.

Stockholm: Average traffic reduction across the control points between 6:30 AM and 6:29 PM is 22%. The reduction reached its peak during afternoon rush hours with a 24% drop. Traffic reduction in the inner city shows a 15% drop in vehicle kilometers traveled. Vehicle travel times dropped significantly within and around the inner city. The largest reductions were observed around the control points, where time spent in congestion was reduced by a third in the morning peak hour and by half in the evening peak hour. No adverse traffic impacts on surrounding road network.

A toll ring around downtown Pasadena would likely be the most successful strategy to reduce traffic significantly within the city. However, there is one major difference between Pasadena and London or Stockholm – there are several other downtowns close to Pasadena, whereas the zones in London or Stockholm are the major attractions.

Figure 3-12 Pasadena's Location in Los Angeles County, CA.



Credit: Wikipedia.

Nevertheless, results from both London and Stockholm show that while traffic has dropped by around 20%, downtown businesses have not suffered any revenue loss. Instead, it has become easier to park and movement through the zones is less impeded by traffic. The congestion charge has also facilitated major improvements in transit and pedestrian/bicycle networks that would not have been funded otherwise.

The following discussion covers a hypothetical implementation of a toll ring around Downtown Pasadena. A charging zone in Pasadena would most likely be more similar in physical boundary to the London zone than the Stockholm zone, since downtown Stockholm consists of several islands which are only accessible by bridges. In Stockholm, only 18 control points are required to monitor the entire area. The London zone, however, is surrounded by 174 camera sites along the boundary and an additional 29 sites throughout the zone.

A Pasadena charging zone could be as small as 2 sq. miles, compared to the London and Stockholm zones of 10 and 13 sq. miles. The boundary of such a zone in Pasadena is shown in the figure below. This zone would require some 35 control points located along the boundary of the zone, or twice as many as in the Stockholm zone but only a fifth of the number of cameras in the London zone.

Figure 3-13 One Alternative for a Pasadena Congestion Charging Zone

Base Map Credit: Wikipedia.

London's and Stockholm's successful congestion charging zones have shown a new spotlight on the possibilities for congestion charging. However, other toll ring systems have been in place in Singapore and Norway for several years.

In addition, the Federal Highway Administration (FHWA) is showing an increasing interest in potential pilot programs in North-American cities. San Francisco has received a $1 million study grant from the Federal Highway administration to study the concept of a congestion charging zone for its downtown, under the FHWA Value Pricing Program. According to the San Francisco County Transportation Authority's Executive Director, José Luis Moskovich, "We will be the first city in the nation to study this concept under the FHWA program," This new view of congestion pricing appears to be attracting business support as well. Kathryn Wylde, CEO at Partnership for New York City, a network for business leaders, declares that businesses in New York now view congestion pricing as a necessary means for New York to continue to be attractive and develop.

Legal Issues

Nossaman, Guthner, Knox & Elliott, LLP, a California-based law firm specializing in complex public policy law, recently produced a memo to evaluate the viability of congestion charging and innovative parking management in a proposed San Francisco development. The concerns expressed would apply to Pasadena equally. As stated in this memo:

"There is no statutory authority under current law providing for the formation of a public agency to levy the Congestion Pricing Charge. The City and County of San Francisco, a charter city would not be able to adopt an ordinance under its broad powers with respect to "municipal affairs" to form such an agency because traffic control is not a "municipal affair" in the sense of giving a municipality (whether holding a constitutional charter or not) control thereof in derogation of the power of the state. In fact, the State has already adopted legislation under the Vehicle Code prohibiting fees for use of public roads. […]Assuming that appropriate state legislation is adopted authorizing the formation of a public agency to levy the Congestion Pricing Charge, it is likely that levy of the Congestion Pricing Charge would not require voter approval under Propositions 13, 62 and 218."

In brief, this would mean that for a Congestion Pricing Charge to be levied in Pasadena, state legislation would be required to authorize the formation of a public agency to levy the charge, and absent direction to the contrary in the authorizing state legislation, the scheme would not require voter approval.

Conclusions

While congestion pricing, based upon its success around the world (including on various American high occupancy toll lanes, such as I-15 in San Diego County) is a powerful tool, and clearly has the capacity to reach this study's goal of reducing traffic on Pasadena streets during the evening peak hour by 25%, it is a measure that Pasadena clearly cannot implement without approval from the state legislature. For this reason, it has been left for last on this list of recommendations. However, it is worth noting that as technical obstacles have fallen, and an increasing number of congestion pricing programs have met with voter approval, congestion pricing is growing in popularity.

If implementing congestion pricing appears a long way down the road, however, or is not desired by the community, the reader should not feel that little can be done. The recommendations previously presented are highly effective. Numerous researchers have compared the benefits produced by reducing parking subsidies, for example, to the effects of charging congestion tolls. In 1967, J. Michael Thomson estimated that parking fees in central London could produce about half the benefits of a peak-period congestion toll for all cars entering central London. In California, Professor Elizabeth Deakin and Greig Harvey estimated that the right level of tolls for

congested roads in Los Angeles in 1991 would average about $0.10 per mile. UCLA's Professor Shoup calculates that free parking at work reduces the cost of commuting by $0.22 a mile, meaning that if Pasadena had to choose either eliminating parking subsidies or congestion pricing, removing the parking subsidies would yield higher benefits.

Perhaps most importantly, many of the recommendations previously cited involve delivering benefits: new transportation benefits for commuters, such as free transit passes; new parking revenues for merchants to spend on public improvements, such as the new streetscapes in Old Pasadena; and new options for residents, such as the option to determine how many or how few parking spaces one wishes to purchase or lease. All of these recommended traffic reduction strategies, it is worth remembering, have been implemented in modern democracies, in places where elected officials and city planners need the approval of the community, and were able to win it.

The purpose of this study, we will again note in closing, is not to decide whether Pasadena citizens wish to take action to reduce traffic. It does, however, provide a clear roadmap, based upon measures that have been proven and implemented, to show how traffic may be reduced if the community wishes to do so.