Reducing Drive-Alone Rates at Small Employer Sites: Costs and Benefits of Local Trip Reduction Ordinances—Pasadena Towers Case Study

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In July 1986 the city of Pasadena, California, adopted a trip reduction ordinance (TRO) that recognized that any new development in the city would generate travel and parking demands that could harm traffic flow and parking in surrounding areas. The experience of one Pasadena developer is evaluated; this developer, in compliance with the TRO, was faced with designing, implementing, and operating a building-based transportation demand management (TDM) program. Vehicle trip data generated by workers at Pasadena Towers are compared with vehicle trip data generated by workers at a neighboring control site. The costs and non-trip-related benefits of the Towers' building-based TDM program are also discussed. The ratio of employees arriving at the work site to the number of vehicles (average vehicle ridership, or AVR) was found to be the same for the control site as it was for Pasadena Towers. This was contrary to expectations and indicates that the transportation program offered by Pasadena Towers did not appear to reduce vehicle trips beyond a base level existing at a similar building with no TDM program. In terms of AVR alone, therefore, the trip reduction program did not appear to be effective. Attitudinal survey results, however, report that 51 percent of Pasadena Tower's employees who rideshare were encouraged to do so by the TDM program. The percentage of employees who use alternative modes to travel to work at Pasadena Towers is also higher than at the control site, suggesting that the program is encouraging workers to rideshare but that the modes they are using do not have as great an impact on AVR as those used by workers at the control site.

In compliance with federal and state Clean Air Acts, the South Coast Air Quality Management District (SCAQMD) introduced an Air Quality Management Plan in 1991 and a Carbon Monoxide Attainment Plan (CO Plan) in 1992. These plans require local governments to adopt and implement trip reduction ordinances (TROs) and growth management initiatives designed to reduce emissions from mobile sources. These requirements go beyond those of Regulation XV, which applies only to employers in the South Coast Air Basin who employ more than 100 employees at any one work site. Although the plan requirements have not yet been enacted into law, they will require local governments to implement trip reduction strategies.

Once the plan requirements are enacted, the SCAQMD will be charged with monitoring the progress of local governments toward their respective goals. If the SCAQMD deems compliance to be insufficient to achieve the established emission reduction goals, it will be required to introduce a regional rule from which jurisdictions making progress toward, or attaining, their targets will be exempt.

In addition to impending requirements from the SCAQMD, Phase 1 of the transportation demand management (TDM) element of the California state-mandated congestion management plan currently requires cities in nonattainment areas to introduce TROs that include requirements for developers to incorporate TDM elements, such as preferential parking, into the design of new buildings. Phase 2, when adopted, will require cities to include in their TROs a wider range of TDM measures. The experience of cities that have already adopted TROs is thus of great interest to cities that are currently required, or may be in the future, to adopt and implement them.

PURPOSE

This study analyzes the impact of a local TRO on trip reduction by comparing employee vehicle trip data generated by workers in two Pasadena office and retail developments. The test building, in compliance with Pasadena's TRO, has TDM elements incorporated into its design, development, and operation. The control building was constructed before the introduction of the TRO and has no TDM elements incorporated into its design and operation. The costs and non-trip-related benefits of the building-based TDM program are also discussed.

It is hoped that this study will (a) help other local governments and developers faced with writing and following TROs to determine the likely impacts in terms of costs and benefits of local TROs; and (b) help regulatory, rideshare, and other agencies determine if building-based TDM programs are appropriate and effective strategies for reducing commute trips among employers with fewer than 100 employees. Although credits will be given only for trips reduced over and above those attributable to Regulation XV, the determination of appropriate and effective strategies for reducing commute trips in the small employer market will become important if the Regulation XV threshold is reduced to include employers with fewer than 100 employees.

PASADENA'S TRO

In July 1986, with no legal requirement, the city of Pasadena, California, adopted an ordinance that established Trip Reduction Standards in Specified Developments. Ordinance 6172 was de-

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signed to reduce the peak-period demand on existing infrastructure by encouraging the use of alternative work schedules and transportation modes other than the single-occupancy vehicle.

Pasadena Towers is a 465,000-ft^2 mixed-use development located in Pasadena's downtown at the southwest corner of the intersection of Lake Avenue and Colorado Boulevard. Phase 1 was completed in 1990 and consists of a nine-story office tower, two subterranean and five aboveground levels of a parking structure, a cafeteria, and a small coffee shop. Phase 2 was completed in 1992 and consists of a second nine-story office tower and a standalone two-story building. Some street-level retail spaces have also been incorporated into the development.

The Pasadena TRO requires that all new major developments (those that will employ more than 500 employees) submit a plan for a TDM program. The ordinance does not set minimum standards for the program but suggests elements that the program might include. To comply with the ordinance, the developers of Pasadena Towers submitted a TDM plan to the city. The program includes an extensive list of TDM elements including, but not limited to, the following: a full-time employee transportation coordinator (ETC) with an office in the lobby of Tower One, ride-matching assistance, bus pass discounts and on-site bus pass sales, a guaranteed-ride-home (GRH) program, reduced carpool parking rates for tenants, and cash incentives for walkers and bicyclists.

Parking Requirements

The parking spaces required to meet city codes were incorporated into the development's design, but as tenants began to occupy the building, the parking requirement increased from 1,262 spaces to 1,460, leaving a shortfall of 198 spaces. In order for a conditional use permit to be granted by the city, the developers, unable to build more spaces, were faced with a choice: provide tenants with off-site parking and make a number of spaces tandem, or reduce the demand for those spaces.

The developers, eager not to harm the desirability of their development by providing off-site or tandem parking, chose to reduce the demand for parking. Demand for 71 spaces was eliminated via shared parking arrangements. Demand for the remaining 127 parking spaces was eliminated via the introduction of an "enhanced" TDM program. There is currently, however, no shortage of parking in the development, but all the space is not yet leased.

Enhanced TDM Program

In recognition of the financial commitment involved in offering and implementing a TDM program, the ordinance provides for developers to reduce their parking requirements by up to 8 percent by providing a full-time on-site ETC. A further reduction of up to 11 percent is also possible if a TDM plan is approved by the city traffic and transportation engineer. The plan must describe the program in detail and estimate the number of trips that the program will reduce and the number of parking spaces for which demand is expected to be eliminated.

To reduce the demand for the remaining 127 spaces (8.7 percent of the code requirement) the developers submitted an enhanced TDM plan to the city. The incentives proposed in the enhanced plan were not extensive, but they did not need to be because the developers already had in place many more TDM elements than required by the ordinance.

PROGRAM COSTS

The budget for the Pasadena Towers transportation program in 1993 is estimated to be $92,000. The total cost is expected to be divided among different program components in the following way:

Component	*Cost ($)*
ETC salary	35,000 (estimated)
Incentives	50,000 (based on past experience)
TMA membership	5,000 (includes GRH program and information resources)
Rideshare fair	2,000
Total	92,000

Who Pays?

The cost of running the transportation program is considered to be an operating cost. Tenants pay for the program in the same way that they pay for utilities: the costs are divided among the tenants on the basis of the area of the space that they lease. The owners pick up the tab for space that is not yet leased. This strategy means that tenants pay a fixed sum regardless of how many of their employees participate in the program. Thus, it is in the interest of individual tenants to encourage as many employees as possible to participate, since the cost of each additional participant will be divided among all the tenants and is not borne solely by the individual tenant.

How Much Do They Pay?

The cost of operating the Pasadena Towers transportation program in 1993 is expected to be $92,000. The total square footage of the development is 465,000 of which 338,000 (72 percent) are currently leased. The cost of the program to the tenants is approximately $0.20/ft^2. The existing tenants, therefore, are currently paying for 72 percent of the program ($66,240). These tenants currently employ approximately 950 employees, which means that, on average, they are paying $70/employee/year. The cost per employee, however, is higher because the owners are footing the bill for 28 percent of the total cost (that portion of the total space that is not yet leased). The actual cost per employee is $97/year.

Cost Comparisons

A study of 37 Regulation XV transportation programs, completed by Commuter Transportation Systems (CTS) in April 1992, found the average annual cost per employee to be $70. A study of 1,095 Regulation XV transportation programs, completed by Ernst and Young for SCAQMD in August 1992, found the average annual cost per employee to be $81. These figures indicate that Pasadena Towers' per-employee cost is higher than the averages found by CTS and Ernst and Young, but the Towers' program offers more

incentives than the average Regulation XV work site. The tenants, however, are actually paying the same as the average found in the CTS study and less than the average found in the Ernst and Young study. However, as the remaining space is leased, the number of employees will increase and the cost per employee should decrease as fixed costs are spread over more employees.

BENEFITS

The benefits of the transportation program can be divided into three broad categories: benefits to the developer, benefits to the tenants and employees, and benefits to the city and the environment.

Benefits to Developer

Benefits to the developer include the following:

- A reduction in parking requirements: in this case the developers, faced with a parking shortfall, were able to avoid the cost and potential inconvenience to tenants of providing tandem or off-site parking. In other cases developers may have the opportunity to save money by actually constructing fewer parking spaces than city codes require. The average national construction cost of an aboveground parking space in 1988–1989, excluding land costs, was estimated to be between $7,000 and $9,000 (*1*).

In this example, if the developer had built the 127 spaces required by the city, the cost might have been between $889,000 and $1,143,000. However, this is a hypothetical cost since the demand for the additional spaces would have been met not via new construction but by tandem parking arrangements or by leasing off-site parking spaces—a solution that would have been much less costly. In any case, the costs of additional construction or of leasing off-site parking is passed on to the consumer (the tenant) in the form of higher leases and operating costs and is not borne solely by the developer. It is in the developer's interest, however, to minimize costs and pass on at least a portion of those savings to the consumer in the form of lower lease and operating costs.

- The program is an added service provided by the building for its tenants that serves to increase the "attractiveness" of the development to potential tenants. For employers with more than 100 employees, the program has the added advantage of reducing many or all of the administrative and organizational duties associated with the legal obligation of complying with Regulation XV.

Benefits to Tenants and Employees

Benefits to tenants and employees include the following:

- Reduced cost and time spent introducing and implementing a transportation program for employers affected by Regulation XV and those who may be affected in the future (i.e., employer sites with 50 to 100 employees).
- Expanded benefit package for tenants to offer employees with little or no administration.
- Economies of scale: if individual tenants were to offer similar programs to their employees, the cost would probably be greater than when provided communally. This has potential positive ramifications if Regulation XV is extended to employers with fewer than 100 employees or if small employers are required to comply with other local trip reduction strategies.
- Direct financial benefit to employees.

Benefits to City and Environment

Benefits to the city and the environment include the following:

- A reduction in social costs, which are environmental costs that are generated by an individual or group of individuals but borne by society as a whole. In the case of new development, the developer reaps financial reward while society pays for the congestion and pollution generated. The introduction of TROs by local governments can, therefore, be seen as a recognition of social costs and an effort to return some of those costs to the developer. In this case, the city of Pasadena is asking developers to take responsibility and pay for measures that will reduce some of the social costs they generate.
- A fundamental benefit of a building-based trip reduction program is that it purports, as the name implies, to reduce trips. A reduction in vehicle trips in turn has a beneficial impact on levels of congestion and pollution, which benefits society as a whole. A local jurisdiction implementing a building-based TRP also benefits by fulfilling, at least in part, their new legal requirement to meet predetermined trip reduction goals.

The primary purpose of this study is to determine the impact of the Pasadena Towers TDM program in an effort to determine the cost-effectiveness of a building-based trip reduction plan (TRP) introduced as a direct result of a TRO. The methodology used to determine the impact of the Pasadena Towers program and the results found are outlined in the following sections.

IMPACT ON TRIP REDUCTION

The impact of a trip reduction strategy is usually measured by comparing trip data recorded before program implementation with corresponding trip data recorded after program implementation; the impact is deemed to be the difference between the pre- and the post-program results. In this case the trip reduction program has been in operation since the building was opened, and no baseline trip data are available. Fortunately, a similar development with similar tenants, and with no TDM program, is available to serve as a control site.

Two North Lake is a 207,000-ft^2 office and minor retail development located catercornered to Pasadena Towers on the northeast corner of Lake Avenue and Colorado Boulevard. Two North Lake houses approximately 550 employees, 420 of whom work for companies with fewer than 100 employees. This building was constructed before the introduction of the Pasadena TRO, and the developer was under no obligation provide tenants with a trip reduction program.

CTS approached the management at Two North Lake in October 1992 to solicit their cooperation to serve as a control group by allowing CTS to survey their tenants to obtain baseline trip data. Management agreed to participate in the study. However, they had little time to devote to the project and, faced with many

more pressing obligatory requirements, were not able to distribute the survey until April 1993.

This illustrates one of the difficulties in using controls to measure the impact of trip reduction strategies: often control sites are under no legal obligation to participate in studies and have little or no incentive to devote the necessary time and resources. Despite these difficulties, however, cooperation was secured and an average vehicle ridership (AVR) survey was distributed to the 380 employees in Two North Lake who work for employers with fewer than 100 employees and who are offered no employer or building-based incentives to adopt alternative transportation modes; 192 surveys were returned, a response rate of 50 percent. This response rate is extremely high, considering that the building owners, management, tenants, and employees are not legally required to survey their employees for commute trip data. An AVR survey was also distributed to the 268 employees at Pasadena Towers who work for employers with fewer than 100 employees and who are offered building-based incentives to adopt alternative travel modes; 179 surveys were returned, a response rate of 67 percent.

Assumptions Made in AVR Calculation

It is assumed that the employees not returning completed surveys use alternative travel modes in the same ratio as those returning surveys. This assumption is contrary to the SCAQMD's methodology for calculating AVR for Regulation XV employers. In SCAQMD AVR calculations, nonrespondents are treated as drive alones regardless of how they actually travel to work; such treatment of nonrespondents has the effect of lowering AVR. This methodology is designed to encourage regulated employers to get as high of a response rate as possible and is also underlain with the belief that users of alternative travel modes are more likely to return surveys than drive alones.

In this study it was decided that since employers in Two North Lake are under no legal obligation to have their employees complete AVR surveys, there should be no penalty for nonrespondents. It is also assumed that since the employees at Two North Lake are not familiar with AVR calculations and were given a financial incentive in the form of a prize drawing to complete and return the surveys, drive alones were just as likely to return surveys as users of alternative modes. To make the comparison between Pasadena Towers and Two North Lake, Pasadena Towers' AVR calculation was treated in the same way: nonrespondents were not counted as drive alones.

Employee Occupations

In Pasadena Towers, 63 percent of respondents work in banking, investment, and finance; 12 percent work in law; 18 percent in insurance; and 7 percent in "other." In Two North Lake, 52 percent of respondents work in banking, investment, and finance; 10 percent work in law and medicine; 33 percent in insurance; and 5 percent in "other."

AVR Results

Two North Lake

The average AVR for the 19 companies is 1.14, with a range from 1.00 to 2.00. The average one-way commute distance for the 192 respondents is 18 mi; 68 percent of respondents indicated that their work hours are regular, and 31 percent indicated that their work hours vary from day to day.

Pasadena Towers

The average AVR for the 11 companies is 1.14, with a range from 1.00 to 1.40. The average one-way commute distance for the 179 respondents is 11 mi; 47 percent of respondents indicated that their work hours are regular, and 46 percent indicated that their work hours vary.

What Do These AVR Results Mean?

The AVR for the control group (Two North Lake) is the same as the AVR for the test group (Pasadena Towers). Using the SCAQMD's methodology, however, the AVR for Pasadena Towers would have been higher due to the lower nonresponse rate; but, as noted, an AVR calculation based on actual responses was judged the most appropriate.

These results indicate that the transportation program offered at Pasadena Towers did not seem to reduce vehicle trips among employees working for small employers. On average, as many trips per employee were made by Towers' workers as by Two North Lake workers. The sample, however, is small, and the behavior of a few individuals can have a dramatic effect on the overall AVR result.

Analysis of travel behavior at the two sites shows that the drive-alone rate is lower at Pasadena Towers (77.9 percent) than at Two North Lake (83.3 percent). This means that a larger percentage of employees use alternatives to driving alone at Pasadena Towers than at Two North Lake. The carpooling rate is also higher at Pasadena Towers (19.8 percent) than at Two North Lake (10.3 percent). This may suggest that employees who might otherwise have ridden the bus to work are being encouraged to carpool; this, in turn, assumes that overall the carpool incentive "package" is more attractive than riding the bus. The fact that the two sites have the same AVR is based on the larger percentage of Two North Lake employees who ride the bus to work (4.1 percent compared with 0.9 percent). Employees riding the bus have a greater relative impact on AVR than carpooling, for example, because more vehicles trips are eliminated.

Workers at Pasadena Towers are also more likely to have schedules that vary from day to day (47 percent) compared with workers at Two North Lake (31 percent). Varying schedules can make it harder for people to commute by carpool and vanpool and also to ride the bus if the schedule is limited.

Pasadena Towers: Attitudinal Survey Results

In addition to an AVR survey, an attitudinal survey was distributed to employees at Pasadena Towers to gain additional insight into the effect of the program. Employee attitudes toward the program are extremely positive, and awareness of the program extremely high. The highlighted results of the attitudinal survey are given here:

- 51 percent of ridesharers indicated that the incentives and information provided by Pasadena Towers influenced their decision to rideshare.

- 84 percent of respondents indicated that they were aware that incentives were offered to encourage them not to drive alone. Those who were already ridesharing, however, were more aware (93 percent) than those who always drive alone (81 percent). Awareness overall, however, is extremely high.
- 84 percent of respondents indicated that they were aware that a rideshare fair was held at the site in September 1992, the level of awareness was the same for ridesharers as it was for drive alones. A larger percentage of ridesharers (89 percent) attended the rideshare fair than drive alones (51 percent), although attendance was still very high for drive alones.
- 75 percent of respondents indicated that they were aware that an ETC was available on-site to help them find an alternative to driving alone everyday. Again, ridesharers were more aware of the ETC's existence (88 percent) than drive alones (71 percent).
- Only 42 percent of respondents indicated that they aware a GRH could be provided in the event of an emergency. Again, the level of awareness was higher among ridesharers (55 percent) than among drive alones (38 percent).
- 50 percent of drive alones indicated that one of the main reasons they did not rideshare was the need for their car before or after work. The need for a car during the day for company or personal business was also stated as a reason for not ridesharing by more than 20 percent of employees.
- 46 percent of drive alones indicated that an irregular schedule was one of the main reasons that they did not rideshare. This is consistent with the 46 percent of respondents who indicated on their AVR surveys that their hours varied.
- Only 4 percent of drive alones were not aware of their other travel options and only 13 percent indicated that they did not have anyone to share the ride with.

In sum, these results indicate that it is probably not a lack of awareness that is limiting higher participation but varying work schedules and lifestyles. Half of respondents who always drive alone indicated that the main reason that they did not rideshare was because they needed their car before or after work. Forty-six percent said an irregular schedule was a reason for their not ridesharing.

Are Building-Based TRPs Effective?

It would seem that, in this case, the Pasadena Towers TRP did not seem to be effective in terms of encouraging employees of small employers to reduce more vehicle trips than similar employees working in a neighboring building with no TRP. Although it must be remembered that the sample is small and that the test site was compared to a control site and not to itself before implementation. Presurveys, however, are not possible in the case of building-based projects since programs go into operation as soon as tenants occupy the buildings

Pasadena Towers is also home to three employers that, by virtue of their size, are obligated to comply with Regulation XV. All three employers use the building-based TDM program as the basis for their Regulation XV TRP, but one offers no additional incentives. There are 140 employees working for this employer, and their SCAQMD-approved AVR, calculated at the same time as the small employers', was 1.30. This appears to indicate that the transportation program alone is not solely responsible for AVR, and that small employers are likely to have lower AVRs than larger companies even when offered the same incentives. This phenomenon may be because employees at smaller sites have a smaller base of potential carpoolers, for example, to choose from. Thus, although there is a large pool of potential ridesharers at the site, some people may be less willing to sign up or less willing to carpool with someone that they do not know. The individual AVRs for the 11 employers in Pasadena Towers appear to show that this may be the case; for example, the seven smallest companies (all fewer than 20 employees) have five of the lowest AVRs.

The fact also remains that the small employers at Pasadena Towers are not held individually accountable for encouraging their employees to rideshare in the same way as Regulation XV employers are. This may translate into a lack of encouragement to their employees or even a lack of understanding if an employee has to leave on time to catch a bus, carpool, or vanpool, which will have a detrimental effect on ridesharing behavior.

This study is also a snapshot in time that does not consider what the future will bring; for example, it is likely that in the future, the continued support of the Pasadena Towers ETC and the building management company will encourage greater participation. In contrast, the AVR at Two North Lake arose essentially by chance and is, therefore, probably not likely to change much in the future.

It must also be remembered that no matter how carefully a control site is chosen, it cannot exactly replicate a test site. It is hoped, however, that this study raises some issues and lays the groundwork for future studies.

What Can Others Learn?

The most important thing for other cities, building owners and managers, and regulators to learn from this study is that for building-based trip reduction programs (and local TROs) to be effective, there may need to be some legislation that hold individual employers accountable. However, before this step is taken, more work needs to be done to determine just what is effective and what is a reasonable AVR target for small employers. More studies need to be undertaken which attempt to establish a base level from which progress can be measured. The 1.14 average AVR for the 11 companies in Pasadena Towers may, in fact, be a good ratio of vehicle trips to employees considering the type and the size of the employers—or it may not.

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