AIRPORT TRANSPORTATION CONTROL MEASURES

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GROUND ACCESS TRIPS AND EMISSIONS

There is a fairly predictable relationship between airport usage and ground access vehicle trips. As Figure 1 shows, the higher the level of airport use, as measured by million annual passengers (MAP), the fewer vehicle trips per day per passenger. This observation is based primarily on data from California airports, in particular the California Aviation System Access Plan (Wilbur Smith Associates, August, 1991). However, the general form of the curve in Figure 1 is found in other studies of airports as well.

The data can be summed to estimate total ground access vehicle trips, which consist of passenger and employee trips to central terminals, not cargo vehicle trips or employee trips to cargo areas. Using vehicle trip data from the California Aviation System Plan or, where unavailable, estimating the volume of those trips based on MAP and the relationship to vehicle trips as in Figure 1, the total vehicle trips across all California airports can be determined. The result is about one half million vehicle trips per day, exclusive of trips associated with cargo areas. About half of this trip volume is associated with the Los Angeles International and San Francisco airports. Cargo-related trips add perhaps another 40 percent to the vehicle traffic for these particular airports.

It is possible to estimate emissions associated with vehicle trips to and from airports. One quick method relies on trip speed and trip length information. For example, the California Aviation System Plan has data on trip lengths and travel times, enabling one to derive speeds, average speeds, and vehicle miles of travel. Combining these data and local air district emission levels based on the vehicle population in the area, it is possible to estimate emissions associated with vehicle trips at any California airport, or airports anywhere, provided the necessary data are at hand. Using this method for the Oakland Airport, the result is about 20,000 pounds per day of CO, HC, NOx, sulfur oxides, and particulates.

TRANSPORTATION CONTROL MEASURES

Employees

Table 1 examines the estimated effect of certain trip-reduction strategies on airport employee vehicle miles of travel (VMT). Effect is estimated in terms of reduced vehicle miles of travel. The table also gives some cautions about each strategy.

To put Table 1 into context, employee vehicle trips make up anywhere from 10 to 20 percent of total vehicle trips for smaller airports, not a great amount. However, at larger airports such as Los Angeles International or San Francisco, when employee trips to cargo areas are included, employee trips can make up to 40 percent of the daily vehicle trips. How trips translate into VMT and ultimately emissions is a function of trip length. Employees tend to make shorter trips than passengers. When all is said and done, it appears employees contribute about 5 or 10 percent of airport VMT at the low end and up to 20 percent of all daily VMT at the high end. Thus, employee trips can be a significant part of airport VMT, depending on the size of the airport.

To illustrate the reasoning by which VMT reductions were derived, consider the entry for variable work hours and telecommuting in Table 1. There is a fair amount of experience on variable work hours and telecommuting suggesting it may reduce either trips or VMT by as much as 30 percent among participants at selected employer sites. Of course, not all employees participate. When the reductions are translated across all employees in the case study sites, the reductions are much less. In terms of all employees at a participating company, the reductions are in the neighborhood of 4 to 7 percent.

How might this experience translate to airport employee trips? One consideration is that airports tend

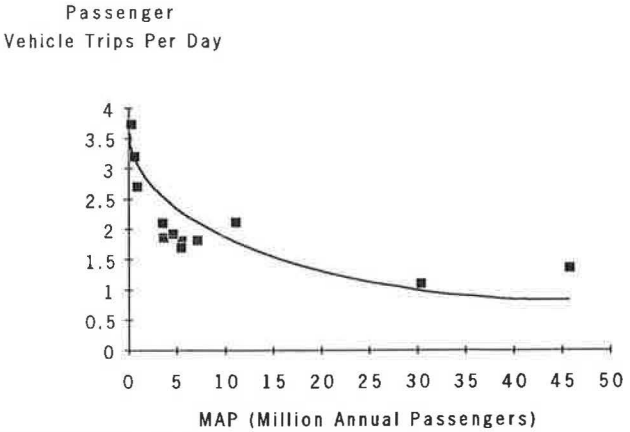

FIGURE 1 California airports: MAPS vs. Trip Generation.

TABLE 1 EMPLOYEE TRIP-REDUCTION EFFECTIVENESS CONSIDERATIONS

Stategy	VMT Reduction Across Airport Employees	Cautions
Variable Work Hours/Telecommuting	2 to 5 percent	Limited application among many shift employees
Preferential HOV Parking (Price/Location)	0 to 5 percent	May switch transit users to auto use.
Transit Fare Discounts and Passes	0 to 3 percent	Reduced revenue for transit operator
General Alternative Mode Subsidies	5 to 7 percent	Limited experience.
Parking Pricing/Subsidy Cash Out	10 percent or more	May generate spillover parking.

to have high levels of shift work. In fact, data from the Sacramento airport indicate only 40 percent of employees arrive in the peak, and many need to be on site at other times for ticket handling, baggage work, and so forth. Therefore, the reductions listed above (4 to 7 percent) probably would not hold among airport employees. Consequently, the chart shows an estimate ranging from 2 percent at the low end to 5 percent at the high end. A similar kind of reasoning underlies the other strategies. First, the experience with the strategy is examined, then it is translated to the airport environment based on characteristics of the airport and its employees.

Cautions are listed in the last column in Table 1. For example, preferential parking for HOV users (carpools and vanpools) has been modestly successful as a trip-reduction strategy, although there is very little experience at airports. It has proven most successful among larger employers with large parking lots and where employees can save time or feel enhanced security by a shorter walk to entrances. However, this strategy sometime draws transit users into carpooling. Obviously, this result is not good for air quality. Thus, it is very important to monitor the prior mode use of carpool and vanpool users of preferential parking spaces.

There is a similar caution with transit fare discounts. The literature suggests such discounts tend to boost usage most among people already using transit. Discounts also can draw people from car and vanpooling as much as from solo driving. Another caution is that discounts can depress revenues for transit operators. There is some experience at Los Angeles International airport with the so-called "Fly Away" discount transit program that has depressed revenues. Besides the loss of revenue, transit operators may face increased costs from expanded service to accommodate increased demand.

There is very limited experience with general subsidies for carpools, transit users, and vanpool patrons. Two cases in the literature include Ventura County and Arco in Los Angeles. However, the experience is so limited as to suggest more evaluation before implementation.

The last strategy in Table 1 holds the most promise. There is substantial evidence that imposing parking fees on employees or removing parking subsidies shifts drivers to carpooling and transit. Notice the table indicates it is the most effective strategy. And unlike other strategies with more limited application to airports, this strategy might be highly applicable for airport employees. Specifically, there is evidence airport employers subsidize employee parking. If somehow employers could be persuaded to reduce or cash out these subsidies, employee solo driving might be considerably reduced.

In California there is new legislation requiring employers in nonattainment areas to offer their employees cash instead of the parking subsidy. Thus, the implementation mechanism for this strategy is already in place.

There is one final caution that applies to all these measures. The reductions in Table 1 refer to employee VMT, not airport VMT. As noted previously, if employee VMT is 20 percent of airport VMT, a reduc-

TABLE 2 PASSENGER TRIP-REDUCTION EFFECTIVENESS CONSIDERATIONS

Stategy	Airport VMT/Emissions Reduction	Cautions
Parking Pricing	1 to 4 percent	Uncertain effect on drop-off; large price hike to be effective; best combined with HOV improvements.
Rental Car, 85% Methanol	2 to 6 percent (emissions)	Fuel not always easily available.
Access Fees/Circulation Controls	2 percent?	Trip fees require AVI.

tion in employee VMT of, say, 10 percent translates into a reduction in airport VMT of only 2 percent. In short, it is important to keep the figures in the proper perspective.

Passengers

Table 2 shows strategies and projected VMT or emission reductions for passengers. Passenger trip-reduction works on the largest segment of ground access trips. Employee trips are only 5, 10, or perhaps 20 percent of airport daily VMT; passenger trips can be 80 to 90 percent,or higher, depending on the balance of cargo trips. In contrast to Table 1, Table 2 gives reductions in VMT for the airport as a whole, taking into account the proportion of VMT attributable to passengers.

Unfortunately, there is very little experience with trip or emission reduction strategies aimed at passengers. There is need for much more experimentation and evaluation in this area.

Look first at parking pricing for passengers. There is some literature on how parking prices affect parking demand, but little on how pricing shifts passenger use among ground access modes. Does pricing reduce solo driving? Does it increase carpooling? Does it cause passengers to park elsewhere? On these issues there is very scanty information.

Experience at Boston Logan airport reveals some of the possible effects of changing passenger parking prices. A boost from $8 to $10 per day in the mid-1980s was associated with some increases in HOV use. At the same time, however, there were improvements in the HOV systems, clouding the issue of what caused what. Furthermore, subsequent HOV improvements without any pricing changes resulted in nearly the same change in the HOV use. The evidence makes one wonder whether pricing played much of a role in mode change at Logan.

Other evidence on this subject comes from work by Greig Harvey. In 1988, he examined the San Francisco airport and concluded that very stiff price changes would be needed to induce mode shifts. Harvey also raised the issue of how price hikes might increase passenger drop-offs. For this reason, Table 2 notes "drop-off" as a caution. If drop-off is increased by parking pricing, it is adverse for air quality because two vehicle trips are replaced by four. If a passenger is driven to the airport by a family member or friend, this makes two trips (to/from) for drop-off and another two trips (to/from) for pick-up, compared to the case where a passenger drives solo, making only two trips (to/from) and parks in the interim.

Is drop-off encouraged by increased parking pricing? There are some data in California and at Boston Logan showing that higher prices are not necessarily associated with higher drop-off. In particular, the drop-off rate at a sample of California airports (as studied by the Metropolitan Transportation Commission) is not consistently higher at airports with higher parking prices. Also, at Logan, when long-term rates increased from 1984 to 1986, pick-up and drop-off actually declined. Still, Table 2 lists drop-off as a caution because it is a possible perverse effect worth considering.

Table 2 shows the estimated range of airport VMT reduction perhaps achievable with a hefty 40-percent price hike, putting aside the drop-off problem. It is based on low passenger sensitivities to price changes as estimated by Harvey and the proportion of passengers parking for the entire duration of their air trip, which

ranges from 10 to 40 percent. The range for VMT reduction is 1 to 4 percent.

The second strategy for passenger cars is use of alternative fuel for rental cars. Vehicles running on 85 percent methanol and 15 percent regular gasoline (so called M-85 vehicles) can reduce ozone emissions by about 50 percent compared to vehicles running on regular unleaded gasoline. Using these reduction factors and information on typical VMT for rental cars, emission reductions from converting all rental cars to M-85 over the next couple of years might be from 2 to 6 percent. Notice the caution called out in the table. Methanol fueling facilities are not readily available. Current flexible-fuel vehicles are certainly more costly than average, and not all models of rental cars are so equipped. To ease this barrier, the California Energy Commission offers a $400 credit against the purchase of M-85 vehicles.

The last strategy listed in Table 2 is management of vehicles accessing and circulating airports. Hotel and parking lot rental car shuttles, limousines, scheduled buses, and on-call vans all create congestion and emissions as they circulate on the airport. One way to dampen the volume of vehicle access and circulation might be to price all airport access. The only airport charging a fee for all access is Dallas/Fort Worth. It imposes an entry fee of 50 cents on all vehicles whether parking or passing through. A fee of 50 cents obviously does not have a substantial effect on demand. However, the fee Dallas/Fort Worth system suggests it is operationally possible to impose such fees.

Another approach to reducing the number of access vehicles and encouraging better utilization is through restructuring the usual fees charged these vehicles. For trip-reduction, fees imposed per trip are better than flat fees or fees based on a percent of gross revenues. Trip fees are commonly levied on cabs and limos, but not commonly on courtesy vehicles. In fact, courtesy fees in California are usually based on a percent of gross or a flat fee. One exception is Los Angeles International, which uses an automatic vehicle identification (AVI) system to impose trip fees on rental car and parking lot shuttles and on on-call vans for circulation over the second circuit. Combined with some holding area regulations, it appears that airport circuits have been reduced by about one third.

Table 2 estimates how such circulation policies might reduce airport VMT. As the center column shows, the estimate is in the range of 2 percent, with a question mark to reflect several uncertainties in the calculation. The caution here is an AVI system is needed to impose trip fees of the sort imposed by Los Angeles International.

DIRECTIONS

This research suggests some promising directions for transportation control measures at airports. For employees, the parking cash-out is promising. It should be modestly effective and certainly more palatable than attempting to end employee parking subsidies "cold turkey." For HOV incentives, there are some promising results from improving transit service and offering fare discounts. However, there is a need for much better evaluations of the fiscal impacts of such policies. Preferential parking for carpools also deserves attention at large parking lots where walking distances can be cut by close-in parking.

For passengers, parking fees might be effective where high proportions of passengers park, especially if this is done in combination with some HOV improvements including better transit service. However, any changes in pricing structures should be carefully evaluated for the result on drop-off. Methanol is promising as an alternative fuel for rental cars. Methanol fueling facilities ought to be considered as part of any airport expansion. Some airports are considering consolidation of rental car facilities. Here again is a good opportunity to consider methanol fueling facilities. Evaluation of this strategy ought to focus on how flexible fuel vehicles are fueled away from the airport and on the effect of incentives such as no charge for refueling upon return of the vehicle to the rental car company. Avis has implemented such an incentive at the Sacramento Airport. Finally, fees for all airport access deserve attention, as well as trip versus flat fees, especially for courtesy and on-call vans.