

# Commission Briefing Paper 4H-02

## Potential Impacts of Flexible Work Schedules on Passenger Travel Demand

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### Introduction

This paper is part of a series of briefing papers to be prepared for the National Surface Transportation Policy and Revenue Study Commission authorized in Section 1909 of SAFETEA-LU. The papers are intended to synthesize the state-of-the-practice consensus on the issues that are relevant to the Commission's charge outlined in Section 1909, and will serve as background material in developing the analyses to be presented in the final report of the Commission.

This paper presents information on the potential impacts of flexible work schedules on passenger travel demand. Work hours policies established by employers govern the time period in which employees travel to and from work. Such policies influence not only the volume of employees traveling during peak traffic periods, but employee propensity to consider transit, carpooling, and other alternatives to driving alone to work. Consequently, work hours management is an important component of travel demand management.

### Background and Key Findings

There are three types of flexible (or variable) work hours schedules with potential application as demand management tools:

- Staggered work hours;
- Compressed work weeks; and
- Flextime.

*Staggered hours* are staged start work times set by employers. For example, employee start times might be set at 15-minute increments. The primary influence of this strategy is to spread peak traffic.

*Compressed workweeks* allow employees to work more hours in fewer days than the usual eight-hour per day schedule. One common option is the "4/10" where employees work 10-hour days over four days. The goal of this approach potentially is twofold: reduce vehicle miles of travel across the workweek and encourage employees to arrive and/or depart outside normal daily peak periods.

Finally, *flextime* allows employees to set their own arrival and departure time within a band of time. The employee is required to arrive within a two- or three-hour band and leave eight hours later. This strategy potentially influences travel in two major ways. In congested areas, it may encourage employees to avoid the most congested times, thereby spreading peak traffic. Where

work hours differences within a company are a barrier to ridesharing, it can also encourage rideshare candidates to coordinate arrivals and departures where they previously could not.

Employees and employers may find alternative work hours attractive not only to open up new transportation options, but also to improve the fit between work and family responsibilities. A four-day workweek or flextime may make it easier for two-worker households to manage shopping, day care and other chores while still working forty-hour weeks. Flexible work hours programs in settings where workers need and want more flexibility in their schedules may reduce absenteeism, tardiness and turnover. For example, one company found flextime reduced sick time and personal leave an average of 3.5 days per year employee and increased productivity by three percent.

New flexible work hours policies and programs will involve an array of private and public sector parties. Company management and corporate policies influence work hours. Employees, through their unions, also determine work hours. The public sector influences work hours policy in several ways. In terms of demand management, localities may encourage flexible work hours through local demand management ordinances affecting employees. Likewise, States and air quality districts may require legislation that sets certain parameters within which any work hours program, flexible or not, must operate.

### **The Nature of Effectiveness of Flexible Work Schedules**

Flexible work hours programs and policies support demand management in three ways:

- Compared to regular employee work hours, e.g., 9 a.m. to 5 p.m., flexible work hours spread arrival and departure times and thereby spread peak period traffic;
- Depending on the type of flexible work hours implemented, employees are encouraged to consider ridesharing and transit use; and
- Compressed workweeks can also reduce the number of vehicle miles of travel by reducing the number of trips made by employees.

Regarding the first point, given the choice of traveling in congested traffic and arriving during the peak period or arriving earlier or later than the peak, many employees will choose to arrive before the peak period. Regarding the second point, where employees resist transit use in part because transit schedules or capacities do not match well with work hours, a change in required arrival or departure times may boost transit use. Under flextime, for example, an employee might arrive early and ride transit before it is so crowded as to require standing. Likewise, more employees might be able to carpool if there is some flexibility in required arrival times. Two employees now living near one another but working different schedules might be able to carpool if they could coordinate their arrival and departure under a new flextime or a 4/10 schedule.

Work hours strategies may not always support ridesharing and transit use. In particular, some experience and research suggests flextime is sometimes associated with less ridesharing, not more. More research is needed to determine why this is the case. It may be that flextime interferes with rideshare arrangements already in place and dependent on fixed work schedules. For example, three commuters arriving at 8:00 a.m. may successfully carpool under fixed hours, but one or more may opt out of carpooling if they are allowed to arrive at different times. It may

also be the case that, by having the freedom to travel outside the most congested portion of the peak period, the traveler loses the incentive to rideshare or use transit. Compressed workweeks do not seem to suffer from the same problem. In fact, there is some evidence suggesting compressed workweeks, in addition to reducing the total number of employee trips per week, may also support ridesharing. Unfortunately, there is no evidence on how staggered work hours affect ridesharing, though one recent study indicates the strategy made it more difficult for program participants to use express bus service.

## Application Setting

Flexible work hours have been implemented in both the public and private sector, and among a variety of work forces:

- ***Flextime:*** most applicable to offices and among administrative and information workers; less applicable to shift workers and assembly lines, or where there is need for continuous communication between workers.
- ***Compressed workweeks:*** applicable to office and administrative functions, especially governmental agencies, perhaps the most applicable flexible hour application to line and piece manufacturing processes.
- ***Staggered hours:*** applicable to offices and piece manufacturing, but not applicable to line manufacturing where workers are highly interdependent.

Flexible work hours operate best as demand management tools where a large number of employees are affected, and where the associated traffic is concentrated rather than spread out. For example, flextime implemented by a large industry or government agency may considerably reduce traffic on streets and highways in the immediate vicinity of the agency or plant. Likewise, peak loading on transit facilities might be reduced.

Because one or another flexible work hours strategy may be applicable to various industries, flexible work hours should not be considered only in urban settings. In fact, one of the more successful examples of employers shifting employee arrival times is in Pleasanton, California, a suburb in the San Francisco Bay area. Here, many large and small employers have shifted employee arrival times in response to a City trip reduction ordinance aimed at reducing peak period travel.

More important than location may be supporting services. In particular, the benefits of work hours strategies in encouraging transit and carpool use depend on the availability of transit options and rideshare matching and monitoring. For example, where transit service is frequent and with available capacity at the “shoulders” of the peak, some employees will find it a more attractive alternative once work hours schedules become flexible.

## Timing of Trips

The first important impact of flexible work hours is on the *time of employee travel*. As discussed previously, one of the most important potential effects of flexible work hours programs is reducing the volume during peak periods.

**Compressed Workweek:** A carefully controlled experiment among Federal employees in Denver showed this strategy could both flatten the peak arrival volume and shift when the peak occurs. Participants arrived one hour earlier on average than before the program, and departed about one hour later. The program flattened the peak in arrival times. The maximum percentage of total arrivals in a half hour period was reduced from 56 to 42 percent. The maximum half hour percentage of total departures also was flattened from 47 to 34 percent. Of course, the influence of such a shift depends on how many employees participate in the program. In this test case, the participation within Federal agencies exposed to the program was 65 percent. About 9,000 federal employees in 42 agencies participated. The most popular forms of compressed workweek were the four-day workweek with ten-hour days and a five/four-nine plan (eight days at 9 hours and one day at eight hours, with one day off in a two week period).

**Flexitime:** This strategy appears to have a positive effect on time of arrival. For example, one test in San Francisco showed at least half of the participants arriving to work 30 or more minutes earlier than before flexitime. Many arrived at work at 7:00 a.m. By traveling before the main peak period, those arriving by car and/or carpool saved an average of nine minutes each trip, or an hour and a half for two-way commuting each week. Over 60 percent reported they encountered “much less congestion” on their way to work. In the test, about 6,000 employees participated in the flexitime experiment across 23 companies.

At Bishop Ranch in California, flexitime policies appear to be successful in shifting employee arrival times to earlier periods. A survey of 14,800 employees between 1988 and 1990 showed the percent of employees starting work before 7:00 a.m. increased from 8 to 17 percent, and the percent starting work after 9:00 a.m. increased from 1 to 9 percent. Departure peaking also has been reduced. The percentage of workers leaving before 4:00 p.m. increased from 12 to 17 percent. The employee flexitime programs were instituted as part of a broad demand management program for the area, as well as a local trip reduction ordinance encouraging reduction of peak hour vehicle trips.

**Staggered hours:** One evaluation of staggered hours in downtown Honolulu found statistically significant reductions in peak period travel time due to spreading of the peak. Travel time was measured from a “floating car,” meaning reductions in actual travel time were measured along specific commute routes. Reductions were up to 18 percent depending on the route, or up to seven minutes in the commute. The study makes clear there are winners and losers under staggered hours. Those making early departures saved the most in travel time. Those shifting to a later arrival time actually lost travel time, because they moved into the new peak period. About 3,500 employees of the 7,100 employees in the Civic Center participated in the project. Participation in the project was mandatory for all public employees, though private sector participation was voluntary. About 18 major corporations participated. Overall, about 11,000 employees participated, or about 18 percent of the downtown work force.

## **Mode of Travel**

A second important impact of flexible work hours is on mode of travel. Flexible work hours programs could conceivably break up carpools or make transit use more difficult depending on

carpool arrangements and transit schedules prior to and after the work hours program is instituted. Some evaluations have addressed this subject.

*Compressed Workweeks:* In the case of Federal employees in Denver, evaluations suggest the strategy had no adverse effects on ridesharing and transit. The Denver study also showed vehicle miles traveled (VMT) reductions for work and non-work travel among participating employees of 15 percent. Given the large number of employees participating, this reduction translates into a fairly large reduction in VMT for Denver Federal employees taken as a whole: 5.6 percent. Another recent study of compressed workweeks suggests the reduction was associated with a decline in solo driving, from 82 percent to 77 percent.

*Flextime:* Some studies show flextime is associated with increased ridesharing, but not in other cases. RIDES, the regional rideshare agency in the San Francisco Bay Area, has found the placement rate among its rideshare applicants on flextime to be 30 percent compared to 16 percent for applicants not on flextime. Another study suggests only about nine percent of workers changed modes due to flextime, and among these, there was a small net change in favor of ridesharing and public transport. Employee surveys in Pleasanton, California, however, suggested only 7.6 percent of Pleasanton workers under flextime use ridesharing compared to 11.4 percent of the entire Pleasanton workforce. Another study of flextime introduced at the Tennessee Valley Authority suggests a small loss (about two percent) in vanpool ridership due to the flextime program. Vanpoolers adjusted their schedules to meet rider preferences for earlier arrival times. However, bus ridership fell considerably (21 percent) because bus schedules were not changed in a similar way. The case shows the importance of coordinating alternative mode services with work hours programs and employee preferences for arrival and departure times. Another study suggests both the importance of coordinating express bus service with flexible work hours and a method for doing so in the case of staggered hours.

### **Non-Work Trip Making**

A third important impact of flexible work hours programs has only recently been recognized. With a shift in work hours, usually to earlier arrival and departure times, more time is available for *non-work* trip making. Therefore, the overall impact of flexible work hours programs on VMT could be negligible or even opposite to that intended. As noted above, the Denver study indicated that such was not the case for Federal employees who worked compressed workweeks. However, insufficient evidence has been collected to state definitively that flexible work hours programs will significantly reduce VMT overall.

### **Travel and Traffic Impact Potential**

As the examples suggest, there is significant variation in the expected traffic impacts of flexible work hours. Much depends on the type of work hours strategy, whether mode choice is affected, as well as time of travel and the nature of the local congestion problem. It should be noted that neither flextime nor staggered work hours measures remove vehicle trips or VMT from the daily travel inventory, but generally only shift their timing. This is acceptable for some TDM situations, but not a solution for others, e.g., air quality problems.

The possible results of implementing a flexible work hours program are summarized here:

- The most probable effect of a flexible work hours program is earlier arrivals and departures of participants, with a flattening in peak period traffic. The magnitude of the peak flattening may be quite substantial. The results of the Denver experiment with compressed workweeks showed a 14 percent decline in the maximum percentage of total arrivals in a half hour period, and a 13 percent decline in the maximum half hour percentage of total departures.
- Compressed workweeks may reduce VMT depending on number of commute days and mode of travel. Compressed workweeks appear to reduce not just work trips, but total trips. Studies suggest VMT reductions of 15 percent. The reason for the VMT reduction is simply the fact that commuters work fewer days per month, and non-work trips do not offset the reductions in work trips. For flextime and staggered work hours, effects on VMT are not so clear-cut. Much depends on whether the mode of travel is affected. The evidence suggests that a switch from driving to transit requires that transit services be frequent and available before peak periods when flextime participants prefer to travel. Good transit service is probably the reason for the boost in transit ridership under the San Francisco flextime experiment. However, where flextime is introduced without good transit service off peak, or where the service is not adjusted to allow for commuters wanting to travel in earlier times, then transit ridership may well decline. The Tennessee Valley Authority case study provides one such instance.

## **Cost Effectiveness**

While the literature does not quantify the costs or benefits associated with flexible work hours programs, one source suggests the costs are minor in comparison to potential benefits in reduced trip making and increased productivity. The following text summarizes the major cost and benefit categories that would be considered in a cost effectiveness assessment of such programs.

### **Costs**

Main cost items include labor time to plan and set up the program, and possible increased utility and security costs associated with opening an office earlier and keeping it open later than usual for the longer hours that people are in the building. Other program costs are mainly those associated with staff time to develop, market, and administer the program. Typically this would be comprised of salary, printing and publication of marketing materials, and any overhead associated with organizing the effort, such as lights, air conditioning, etc. A study of firms in Lower Manhattan suggests that 15 percent of firms involved in staggered work hours reported problems in communication among employees on different schedules, but said these cost were balanced by other efficiency gains in increased employee punctuality.

### **Benefits**

The benefits of flexible work hours accrue to the employee, the employer, and the community. The community benefits from fewer vehicles on the road during the rush hour. The reduction of traffic demand during the peak hours may reduce or defer the need for additional capacity. Employees realize fewer trips, reduced costs (e.g. for vehicle maintenance and/or commuting), and travel time savings in their commutes. By adopting earlier or later hours than nearby employers, a company allows its employees to avoid the worst periods of traffic congestion and transit crowding. The employer benefits because the job satisfaction of its employees will

increase by at least the value of the employees' cost and time savings, making it easier to attract and retain valuable workers. A study of flextime indicated voluntary increases in employee work hours, reduced tardiness, and reduced work hours missed due to inclement weather. Large companies may also stagger work hours to alleviate on-site crowding at plant gates and exits from office parks.

The effectiveness and savings of the program will depend, of course, on the proportion of employees that begin flexible work hours and their respective before-and-after driving habits. The Denver experiment gives clues on both points. In the experiment, 65 percent of employees exposed to the program changed work hours, and among this group the total VMT reduction was 15 percent. In Seattle, a survey of employees placed on flextime showed a decrease in the percentage that drive alone from 24 percent to 14 percent.

As noted, the traffic impacts of alternative work hours vary with the specifics of the application. The most probable impact of programs such as flextime will be a flattening of peak period arrival rates. In some cases, however, there is evidence that some programs, most notably compressed workweeks, reduces vehicle miles of travel for all trip making. Flexible work hours programs might also offer the scheduling flexibility needed to meet bus schedules and arrange carpooling more conveniently

Similarly, the net benefits to employers of alternative work hour programs will vary by characteristics of program implementation. Several examples of flextime programs indicate a net savings to the employers. The Pacific Gas & Electric Company of San Francisco reported annual savings from flextime of \$20,000 in decreased sick leave and \$46,000 in decreased use of work time for personal business. The City of Berkeley credits flextime with reducing overtime costs by \$18,000 and sick leave costs by \$26,000 annually.

## **Implementation Issues**

Flexible work hours may involve some implementation hurdles. Sometimes labor union agreements will restrict the hours employees work. Any change may require formal meeting and negotiating. Management may resist flextime believing it reduces flexibility to schedule meetings or inhibits responsiveness to clients and customers. One study of four-day workweeks suggests managers believe communication between departments and between agencies or firms may be adversely affected. Another survey of State Departments of Transportation found employees generally favored alternative work hours, but management expressed concern about employee supervision.

As programs in Hawaii, Denver and San Francisco suggest, large numbers of employers can be involved in flexible work hours programs even without regulation. Aggressive campaigns initiated by the public and private sector in employment centers may be sufficient to attract considerable participation. However, flexible work hours also can be encouraged through trip reduction ordinances, air quality regulations, and other policies. These regulations can require employers to consider flexible work hours as part of demand management programs, and to implement work hour changes as part of demand management programs where feasible and beneficial.

City, county, and State governments also might consider mandatory flexible work hour programs for their employees, especially where large government centers contribute to local traffic and congestion problems. Care is needed in designing such programs, as the case of mandatory programs for government employees in Honolulu suggests. Those employees obliged to shift to a later arrival time under the staggered work hour program experienced greater travel time compared to their previous situation, leading to considerable resentment and dissatisfaction. In the experiment, all private sector managers reported the same or better level of employee morale during the project under their voluntary program. In contrast, city-county managers reported worse or much worse employee morale during their mandatory project. Probably the best approach is to require agencies and departments to devise the best work hour system for their particular functions and public interaction needs. Furthermore, employees probably will prefer compressed workweeks and flextime to staggered work hours.

Finally, State policies and legislation may need revision in some cases to encourage flexible work hours. Many States have fair labor acts and standards that limit the maximum number of hours worked without compensation for overtime. Sometimes the legislation requires work in excess of 40 hours per week to be compensated at some multiple of regular hourly rates. While this is not a barrier to flextime, it could present implementation issues under compressed workweek programs by allowing more than 40 work hours in certain weeks. Less common is legislation setting maximum requirements on a daily rather than weekly basis. State labor legislation of this kind would have to be changed to allow any form of compressed workweek.