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BY THE U.S. GENERAL ACCOUNTING OFFICE

## Report To The Secretary Of Transportation

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# Spreading Commuter Work Hours Could Reduce Transit Costs

Meeting the demands of peak service commuting is expensive, requiring the purchase and maintenance of buses and railcars and employment of more transit workers than are needed outside of rush hours. Spreading work arrivals and departures more evenly over a longer period could eliminate the need to purchase or rehabilitate transit vehicles and could reduce labor costs.

The employers and employees GAO surveyed in Philadelphia and Pittsburgh indicated a willingness to change their work hours away from peak commuting times. GAO also examined six transit routes in these cities and determined that fewer transit vehicles would be needed and reduced labor costs could be achieved by spreading the commuter work hours.

In light of the continuing large Federal investment in transit vehicles, GAO is making recommendations to the Secretary of Transportation on actions that should be taken to encourage State and local governments and transit systems to deal with the peak period problem.



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RESOURCES, COMMUNITY,  
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B-209596

The Honorable Elizabeth H. Dole  
The Secretary of Transportation

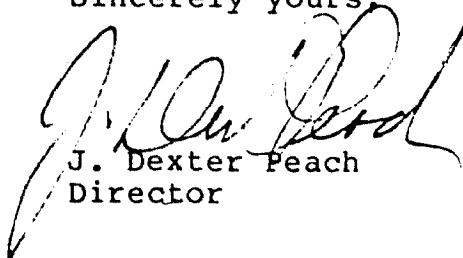
Dear Madam Secretary:

This report discusses the need for the Urban Mass Transportation Administration to encourage the spreading of commuter work hours to relieve peak transit demand in cities where peaking is a problem for transit systems. We made our review because of the financial drain that peak period service has had on transit authorities and the recent movements to change employee work hours.

The report contains recommendations to you on page 39. As you know, 31 U.S.C. §720 requires the head of a Federal agency to submit a written statement on actions taken on our recommendations to the Senate Committee on Governmental Affairs and the House Committee on Government Operations not later than 60 days after the date of the report and to the House and Senate Committees on Appropriations with the agency's first request for appropriations made more than 60 days after the date of the report.

In addition to the committees mentioned above, we are sending copies of this report to the House Committee on Public Works and Transportation and the Senate Committee on Banking, Housing and Urban Affairs. Copies are also being sent to your Assistant Secretary for Administration.

Sincerely yours,

A handwritten signature in dark ink, appearing to read "J. Dexter Peach".

J. Dexter Peach  
Director



D I G E S T

GAO's examination of six subway, streetcar, and bus routes in Philadelphia and Pittsburgh, Pennsylvania, showed that if the present rush hour could be spread evenly over a longer period, rather than the approximately 1/2-hour peak period that exists now, fewer vehicles would be needed on these routes. Vehicles could make a second or third trip during the flattened and extended period and still carry the same number of passengers. On the six routes examined, potential long-term savings of \$4 to \$44 million could result from rehabilitating or purchasing fewer vehicles, and annual labor costs could be reduced up to \$400,000. (See pp. 5 to 15.)

GAO's objective was to determine whether costs for purchasing transit vehicles and operating transit systems could be reduced by changing employee work hours. Although potential savings were identified on the routes GAO studied, the savings may not occur for some years--until vehicles need to be replaced and work hours are spread.

Nationwide, 43,000 buses, 7,500 subway cars, and 550 streetcars are needed to provide peak period service. Outside the peak period, half or more of the equipment is idle or underutilized. GAO believes that the potential for savings identified on the six transit routes in Philadelphia and Pittsburgh also exists on other transit routes in these and other cities. (See pp. 15 to 20.)

Potential Federal savings due to reduced need for vehicles could be significant. The Urban Mass Transportation Administration (UMTA) has provided transit authorities with up to 80 percent of the cost of capital equipment and up to 50 percent of operating deficits. During the next few years it is expected that UMTA will be providing transit systems about \$4 billion annually for capital and operating purposes.

EMPLOYER AND EMPLOYEE WORK-  
HOUR CHANGES ARE FEASIBLE

To determine the potential for changing work hours, GAO sent questionnaires to 158 large employers in Philadelphia and Pittsburgh. Over half of the employees working at the organizations already had some kind of variable work schedules. Most of the employers believed their work schedules had a favorable impact on profitability and maintaining employee productivity. Potential for more spreading of variable work schedules exists. Nearly half of the employers with fixed work hours said they could shift starting times 30 minutes earlier or later easily or with little impact on operations. (See pp. 23 and 24 and 27 to 29.)

Employees picked at random at three organizations to receive GAO's questionnaire expressed a willingness to change starting and finishing times away from the peak periods. (See pp. 25 to 27.)

There have been successful programs where employers and employees have changed work hours. (See pp. 31 to 35.)

UMTA NEEDS TO MORE ACTIVELY  
ENCOURAGE CHANGES TO WORK HOURS

UMTA's efforts to encourage spreading of employee work hours generally have been modest. UMTA funds research, program planning, and demonstration projects for spreading employee work hours to relieve peak transit demand. It has not determined which urban areas have peaking problems that could be relieved by further spreading of work times and has not developed guidance for transit authorities to use in developing and operating variable work-hours programs. (See pp. 36 and 37.)

As a condition for receiving Federal funds for operating transit systems and buying new vehicles, each transit authority is required to participate with other governmental entities to develop a transportation improvement plan. Promoting variable work hours is an accepted activity but is not required in the transportation improvement plan. (See p. 37.)

UMTA provides large amounts of funds to purchase and rehabilitate vehicles. Potential savings can be achieved by spreading the times when employees travel to and from their jobs. Employers and employees expressed willingness to change their work hours. GAO believes UMTA needs to actively encourage and support local programs to vary employee work hours over long time periods. Giving transit authorities that participate in variable work-hours programs preference for funds to purchase vehicles would give them an incentive to participate.

#### RECOMMENDATIONS

GAO recommends that the Secretary of Transportation direct the Administrator of UMTA to:

- Determine which urban areas have a peaking problem that can be alleviated by additional spreading of work hours.
- Require areas that can benefit by spreading work hours to address variable work-hours programs in their transportation improvement plans.
- Establish guidance for local transit authorities, planning organizations, employers, and others to use in establishing and operating variable work-hours programs.
- Give preference in providing discretionary grants for purchases of vehicles to urban areas where the transit authority has actively participated in establishing variable work-hours programs and to those urban areas that tried to establish a program but were unable to do so. Transportation authorities that do not participate should be required to demonstrate acceptable reasons for not participating before they receive grants to purchase vehicles.

#### AGENCY COMMENTS AND GAO's EVALUATION

The Department of Transportation and the transit authority in Pittsburgh agreed that spreading the peak would result in savings. However, the transit authority believed GAO's basic assumption that arrivals and departures can be uniformly distributed resulted in overly optimistic savings.

GAO initially discussed its assignment approach with a Department official who suggested that two cities would be sufficient to demonstrate the potential savings involved if work hours could be spread.

GAO estimated the cost impact of a flat distribution of work arrivals and departures over 2-1/4-hour periods as one example of possible savings from changing work hours. GAO recognizes that more or less savings could be achieved depending on the time period over which work hours could be spread and the amount of flattening that could be achieved. (See pp. 20 and 21.)

To demonstrate potential savings over a different period, GAO, in its final report, also analyzed the six routes using 1-3/4-hour periods. This analysis showed that savings could be achieved, but the amount would be less than with the longer period. (See pp. 13 to 15.)

The Department believed GAO's recommendations were not consistent with the administration's policy of providing greater flexibility to State and local jurisdictions to plan and develop transportation programs and projects best suited to their individual needs. GAO believes its recommendations are more consistent with the policy than the Department recognizes because the information GAO recommended be developed should help local transit authorities in making decisions. Furthermore, the Department would not be precluded from providing grants to local transit systems that do not participate in variable work-hours programs. It merely would be required to determine that appropriate actions be taken before grants are made. (See pp. 40 and 41.)

The transit authority in Philadelphia was concerned that it did not control the work or traveling times of its passengers and that peak period vehicle requirements also are affected by school children. GAO has observed that variable work-hours programs have been successful even though program managers did not control commuters' work hours. GAO recognizes that in Philadelphia changes in both school hours and commuters' work hours will be needed.



The transit authority in Philadelphia also said that if work hours were spread out, it would choose to increase the level of service rather than reduce the number of vehicles in the fleet. GAO recognizes that the authority could use the spreading of commuter work hours to increase the quality of service rather than to reduce vehicle needs. (See pp. 21 and 22.)



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ABBREVIATIONS

CBD           central business district  
DOT           Department of Transportation  
GAO           General Accounting Office  
MBTA          Massachusetts Bay Transportation Authority  
PAT           Port Authority Transit  
SEPTA         Southeastern Pennsylvania Transportation Authority  
UMTA          Urban Mass Transportation Administration



## CHAPTER 1

### INTRODUCTION

The urban weekday rush hour is an expensive burden for mass transit authorities and an endurance trial for many metropolitan commuters. Because the number of mass transit vehicles and operators needed is dictated by peak use, while they are underemployed for the rest of the day, more efficient management of peak demands is vital to bringing down capital and labor costs.

One approach to the peak use problem is to stretch out the rush hour by adjusting work hours so that everybody does not come to work during one short period. More widespread use of variable working hours would alleviate commuter congestion and cut the capital costs of mass transit. It could also bring about small reductions in operating costs.

A transit peak is the period when the most people are riding on mass transit. Certain U.S. cities have identified morning and evening rush hours and within those, the shorter peak period of heaviest ridership. In Philadelphia the morning rush hour lasts about an hour and a half, from 7:30 a.m. to 9 a.m., and peaks for the half hour 8 a.m. to 8:30 a.m. In Pittsburgh the morning rush hour lasts from 7 a.m. to 9 a.m., with 8 a.m. to 8:30 a.m. the peak period.

#### PEAK SERVICE IS VERY EXPENSIVE

Meeting the demand for peak service is very expensive, requiring transit systems to purchase and maintain buses and rail cars and employ more workers than are needed outside of peak hours. If transit systems provide enough vehicles and personnel to handle the rush hours, many of the vehicles and much of the labor force may not be needed during the rest of the day. For example, one subway line in Philadelphia needs 180 subway cars for the peak period but uses only 78 cars during the middle of the day. In Pittsburgh peak service requires 2.2 times as many vehicles as are needed in the middle of the day. Moreover, mass transit vehicles are expensive. Subway cars and streetcars cost \$570,000 to about \$1 million each, and buses cost about \$150,000.

A 1976 study of British transit economics, one of the few studies made of the cost of peak services, showed that bus services operating in peak hours only were disproportionately responsible for bus transit deficits in Bradford, where on a typical weekday passengers took about 300,000 trips by bus. <sup>1/</sup> The Bradford bus

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<sup>1/</sup>By comparison, in 1980 the fifth largest mass transit system in the United States, greater Boston's Massachusetts Bay Transportation Authority, carried 250,000 weekday passengers.

study showed a revenue-to-cost ratio of 0:47 for the peak-only use of vehicles (4 hours), whereas revenue from all-day services (18 hours) covered 94 percent of costs--nearly a break-even operation.

The Bradford bus study examined the cost of increasing or decreasing services at different periods of the day. Per bus hour, the cost of providing an extra bus during peak periods was about 2-1/2 times the cost per hour of providing an extra bus for all-day services. The savings per bus hour from removing one bus during the 4-hour peak periods were nearly five times the savings from removing a bus during the 14-hour off-peak periods.

A former official of the Urban Mass Transportation Administration's (UMTA's) Office of Policy Research commented in 1980 that these British findings are even more important for the United States, where the typical bus system operates with a peak-to-base ratio of over 2:1 compared with about 1.5:1 in Britain. <sup>1/</sup> Citing statistics showing that transit peaking in the United States grew over the period 1960-73, the official attributed that trend to a number of factors. Among the factors he cited were the decline of the central city except for office-oriented activities; the increasing number of women in the work force; continued suburbanization, with suburbanites using transit to travel to and from work while using automobiles for other trips; the transition to a service economy with increases in the number of people working a "9-to-5" workday; and the greater sensitivity of off-peak riders to fare increases with resulting reductions in off-peak ridership. The former official predicted that "particularly as further suburbanization of transit is contemplated, peak cost factors will become overwhelmingly important as the source of growing deficits."

#### FEDERAL SUBSIDIES SUPPORT MASS TRANSIT

To accommodate peak-hour demand and suburban spread, transportation policies have called for enormous expenditures on vehicles and facilities which are used relatively little during most of the day. UMTA has made grants of up to 80 percent of the capital costs and 50 percent of a transit authority's operating deficit.

The Federal Government has been providing assistance to public transit since 1961. In fiscal year 1982, UMTA's operating and capital grants exceeded \$3.5 billion. The Urban Mass Transportation Act of 1964, as amended (49 U.S.C. 1601), and the Federal-Aid Highway Act, as amended (23 U.S.C. 101), established four programs for UMTA capital assistance--(1) section 3 discretionary grants or loans, (2) section 5 formula grants, (3) interstate

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<sup>1/</sup>A peak-to-base ratio compares vehicles needed during the morning and afternoon peak commuting periods with vehicles needed between these two commuter periods.



transfer grants, and (4) Federal-aid urban systems grants. Section 3 grants are awarded selectively to assist States and local governments in providing financing for local transportation. Section 5 grants are made for capital and operating assistance. UMTA apportions section 5 funds to urban areas based largely on population density. Federal-aid urban systems funds can be used to support either mass transportation or urban highways in urbanized areas.

Section 8 of the Urban Mass Transportation act provides that UMTA should cooperate with State and local officials to develop transportation plans and programs. The planning process is to include an analysis of alternative transportation system management and investment strategies to make more efficient use of existing transportation facilities.

Most of the capital assistance in fiscal year 1982 was obligated under the section 3 program (\$1.6 billion). Other capital grants were given under the section 5 program (\$1.4 billion) and the Interstate Transfer to Transit Program (\$568 million). During fiscal year 1982 UMTA made commitments to purchase 3,250 buses, 414 subway cars, and 55 streetcars--costing about \$860 million.

The Federal Public Transportation Act of 1982 (Public Law 97-424) gives the public transit industry its first dedicated revenue source in history, representing an estimated \$1.1 billion annually. Beginning with fiscal year 1984 and for the remaining 3 years, section 3 will be funded by the proceeds from transit's 1 cent of the gasoline tax revenue for discretionary capital purposes. Section 3 grants will be reduced from 80 percent to 75 percent of project costs.

In fiscal year 1984, a new section 9 block grant formula program will be implemented with funds from general revenues. Section 9 block grant funds can be used at local option for capital and operating purposes. No new section 5 operating funds are to be provided after fiscal year 1983. It is expected that UMTA will provide transit systems about \$4 billion annually for capital and operating purposes through fiscal year 1986.

#### WHAT ARE VARIABLE WORK HOURS?

Various studies have shown that transit peaking becomes less of a problem if enough employers change work hours and if employees accept the change. In the last decade many employers and employees have come to use variable working hours--referring to all working schedules that differ from the standard 5-day week.

Three of the most common types of variable schedules are flexitime, compressed work weeks, and staggered hours. The most popular of these is flexitime, which has been accepted in the United States since about 1971. Under flexitime, or flexible working hours, employees choose when to arrive at and leave the

workplace, within limits set by management. Flexitime hours must add up to the number of hours required for full-time work. A compressed work week is full-time work done in less than the usual 5 days; for example, 4 10-hour workdays. Under staggered hours, groups of employees are scheduled to start work at different times, thus spreading the load on transportation facilities. Government agencies in Washington, D.C., have used staggered hours for years, and that city experiences relatively extended transit peaking.

According to a 1981 report from the Work in America Institute, a nonprofit organization created to advance productivity and the quality of working life, in May 1980, 9.4 million workers--14.6 percent of all full-time nonfarm wage and salary workers--were on flexitime or compressed workweeks. The Institute, after reviewing experiences with variable work hours, recommended that "State and local governments, in concert with employers and unions, should take the initiative in organizing area-wide flexitime programs." The Institute specified flexitime because workers on flexitime typically start work earlier than most employers would choose to require under staggered hours; as a result, flexitime spreads peak demand over a longer period of time.

#### OBJECTIVES, SCOPE, AND METHODOLOGY

In undertaking this review, we noted that providing peak period service is a financial drain on transit authorities, that the Federal Government has provided substantial financial support in recent years to transit systems, and that movements have been underway during the past decade to change employee working hours. Our objective was to determine whether costs for purchasing transit vehicles and operating transit systems could be reduced by further changes in employee work hours. We wanted to determine what work schedule changes would maximize transit system efficiency during rush-hour periods and whether such schedule changes were feasible. The review was performed in accordance with generally accepted government audit standards.

We made our review at UMTA headquarters in Washington, D.C.; transit authority offices in Philadelphia and Pittsburgh, Pennsylvania; New York, New York; and Washington, D.C.; and regional planning organizations. At UMTA headquarters we researched past efforts by UMTA to study, test, promote, and fund programs to spread work hours. In Philadelphia and Pittsburgh we sent questionnaires to large employers in the central business districts (CBDs). We contacted local government and transit officials in Boston, New York, Philadelphia, Seattle, and elsewhere to obtain information about programs that have been undertaken to spread employee work hours. We contacted these persons to obtain a broad perspective on the nature of the peaking problem, to find out what could be done to help solve the problem, and to estimate what the financial impact of changing work hours would be. (Ch. 5 gives further detail about the scope and methodology of our review.)

## CHAPTER 2

### SPREADING EMPLOYEE WORK HOURS CAN REDUCE TRANSIT SYSTEM EQUIPMENT NEEDS AND OPERATING EXPENSES

Spreading the times over which employees in CBDs arrive at and depart from their jobs could reduce the equipment needs of major urban transit systems. In Philadelphia and Pittsburgh, where we tested the effect of spreading employee arrivals and departures evenly over longer time periods, transit system equipment needs were reduced by 7 to 30 percent on five of six routes tested. The transit systems could use existing vehicles more efficiently so that fewer vehicles would need to be purchased in the future. Potential savings could be about \$17 million to \$44 million at today's prices. Even if the two transit authorities opted to rehabilitate existing subway cars and street cars, potential savings could be \$4 million to \$10 million. Potential labor savings for the six routes could amount to \$400,000 annually.

The large amounts of funds UMTA provides to major metropolitan areas make it worthwhile for transit authorities, employers, local governments, and the Federal Government to cooperate in changing work-hour patterns. We believe that the potential for savings exists in many major cities because peak transit demand commonly occurs on transit routes serving CBDs.

#### REDUCED EQUIPMENT NEEDS ARE POSSIBLE ON A VARIETY OF ROUTES

In Philadelphia and Pittsburgh, we examined the impact on six transit routes of spreading ridership evenly over 2-1/4- and 1-3/4-hour periods in the morning and afternoon. We chose routes and transit modes typically found in these and other large cities as follows.

Philadelphia:		
Market-Frankford Line		Subway service to and from the CBD.
Routes 59, 66, and 75		Bus service from residential areas of the city to stations on the Market-Frankford Line.
Pittsburgh:		
Route 42/38		Street car service from city and suburban residential areas to the CBD.
Route 68G		Express bus service from suburban residential areas to the CBD.

Each of the transit routes we analyzed required from 2.2 to 5 times as many vehicles for the peak periods as they did for the midday periods, as shown below.

	<u>Number vehicles required</u>			<u>Maximum peak-to-base ratio</u>
	<u>A.M. peak</u>	<u>P.M. peak</u>	<u>Mid-day base (note a)</u>	
Philadelphia:				
Market-Frankford Line	174	180	78	2.3:1
Route 59	11	12	5	2.4:1
Route 66	24	25	11	2.3:1
Route 75	9	8	4	2.2:1
Pittsburgh:				
Route 42/38	25	22	8	3.1:1
Route 68G	10	9	2	5.0:1

a/The midday base period is the number of vehicles in use at 12 noon.

A 2-1/4-HOUR PEAK PERIOD SPREAD WOULD SUBSTANTIALLY REDUCE VEHICLE NEEDS

We analyzed vehicle needs that would exist on these routes if peak period ridership were spread evenly over a 2-1/4-hour period and compared this with actual vehicle needs. We found that spreading peak ridership would reduce vehicle needs by 20 to 30 percent on five of the six routes we analyzed. On the sixth route, no reductions would occur; ridership on this route did not appear to be affected by Philadelphia CBD work-hour patterns.

The improved efficiency we identified would result from evenly spreading commuter riding over the two 2-1/4-hour periods 7 a.m. to 9:15 a.m. and 3:30 p.m. to 5:45 p.m. More vehicles would be able to make additional trips, reducing the number of vehicles that make only one trip during the peak period. The potential vehicle reductions for the six routes are shown below.

	Maximum number of vehicles required		Differ- ence	Percent reduction
	<u>Peaked</u> <u>distribution</u>	<u>Even</u> <u>distribution</u>		
Philadelphia:				
Market-Frankford Line	180	144	36	20
Route 59	12	9	3	25
Route 66	25	19	6	24
Route 75 (note a)	9	-	-	-
Pittsburgh:				
Route 42/38	25	18	7	28
Route 68G	10	7	3	30

a/We did not modify the schedule on this route because peaked ridership did not occur.

Since fewer vehicles would be needed in these cities, fewer would need to be rehabilitated or purchased. Actual savings to the transit authorities in these cities would vary by the amount of work-hour spreading and the costs of the vehicles at the time of purchase or rehabilitation. We made our estimates to provide an indication of the potential for savings that transit systems could achieve if work hour arrivals and departures were evenly spread over 2-1/4-hour periods in Philadelphia and Pittsburgh.

Future vehicle purchases  
can be reduced

On the six routes analyzed, the two transit authorities eventually would be able to avoid nearly \$44 million in vehicle purchases if employee arrivals and departures were evenly spread over 2-1/4-hour periods. In making our estimates, we used current costs to purchase vehicles similar in capacity to those used on the routes we analyzed. We also used the most recent schedules and ridership data available. The impact on each route we analyzed is shown below.

	Number vehicles eliminated from schedule (note a)	Current replace- ment cost per vehicle	Sub- total	Reserve require- ments (note a)	Total
----- (000 omitted) -----					
Philadelphia:					
Market- Frankford Line	36	\$900,000	\$32,400	\$4,860	\$37,260
Route 59 <u>c/</u>	3	150,000	450	67	517
Route 66 <u>c/</u>	6	150,000	900	135	1,035
Route 75 <u>c/</u>	0	0	0	0	0
Total			<u>33,750</u>	<u>5,062</u>	<u>38,812</u>
Pittsburgh:					
Route 42/38 <u>d/</u>	7	575,000	4,025	604	4,629
Route 68G <u>c/</u>	3	150,000	450	67	517
Total			<u>4,475</u>	<u>671</u>	<u>5,146</u>
Total			<u>\$38,225</u>	<u>\$5,733</u>	<u>\$43,958</u>

a/An additional 15-percent fleet reduction would be possible above those removed from the transit schedule because reserve requirements for periods when vehicles are undergoing repairs and maintenance would also be reduced. For example, on the Market-Frankford Line, a total of 41 vehicles could be removed from the fleet (36 from scheduled service plus 5 from reserve requirements).

b/Route uses subway (rapid transit) cars.

c/Route uses buses.

d/Route uses streetcars.

As shown on the above table, the largest potential for savings is on the Philadelphia Market-Frankford Line. Southeastern Pennsylvania Transportation Authority (SEPTA) officials told us that it will be at least 10 years before the vehicles on that line will need to be replaced. To realize the savings we are projecting for this and other lines, peak ridership would need to be spread evenly over the 2-1/4-hour periods by the time the next vehicle purchase is made.

### Future rail vehicle rehabilitations can be reduced

Both the Port Authority Transit (PAT) and SEPTA have programs underway to rehabilitate some of the subway cars and streetcars in their fleets. With ridership evenly distributed over a longer time period, PAT and SEPTA could rehabilitate fewer vehicles.

A SEPTA official told us that the authority plans to rehabilitate the entire fleet of vehicles used on the Market-Frankford Line, at an expected cost of \$200,000 per vehicle. If worktimes were spread evenly over the 2-1/4-hour periods, SEPTA would have the option of rehabilitating 41 fewer vehicles (36 vehicles that could be removed from the transit schedule plus 5 reserve vehicles), thereby saving \$8.2 million.

In Pittsburgh a program is underway to rehabilitate some of the streetcars now used on route 42/38 and on four other streetcar routes at a cost of about \$250,000 per streetcar. If peak period ridership had been evenly spread during the time covered by our analysis, PAT's vehicle requirements for route 42/38 would have been reduced by 8 vehicles (7 streetcars that could be eliminated from the transit schedule plus 1 needed for reserve), and PAT would have had the option of reducing rehabilitation costs by \$2 million.

### Spreading the peak could reduce transit labor costs

While the potential for labor savings was not as extensive as for capital savings, some reductions in labor costs would result on the five routes where vehicle reductions would occur. With the exception of route 42/38, the reductions were less than 6 percent. We attribute the potential labor cost reduction of 22 percent on route 42/38 to our using PAT's recommended 65-passenger per vehicle load as compared with the route's existing 51-passenger per vehicle load at the time of our analysis. On the other routes, labor costs would have been reduced by small percentages, as shown on the following page.

	<u>Total labor hours per day</u>		<u>Difference</u>	<u>Percent reduction</u>
	<u>Peaked distribution</u>	<u>Even distribution</u>		
Philadelphia:				
Market-Frankford Line	648.0	636.8	11.2	1.7
Routes 59, 66 and 75 (note a)	520.8	490.1	30.7	5.9
Pittsburgh:				
Route 42/38	272.4	213.5	58.9	22
Route 68G	71.6	67.9	3.7	5

a/Drivers for these routes are scheduled interchangeably, as if this were one large route.

The potential annual savings for all routes was \$398,040. The 42/38 trolley route in Pittsburgh represents \$242,416 of the total. The following table shows the hours reduction possible, the labor cost per hour, the total potential savings daily, and the total potential savings annually.

<u>City/route</u>	<u>Hours reduction possible</u>	<u>Labor cost per hour (note a)</u>	<u>Potential savings per day</u>	<u>Potential savings per year (note b)</u>
Philadelphia:				
Market-Frankford Line	11.2	\$13.14	\$147.17	\$ 37,528
Routes 59, 66, and 75	30.7	13.14	403.40	<u>102,867</u>
Total				<u>140,395</u>
Pittsburgh:				
Route 42/38	58.9	16.14	950.65	242,416
Route 68G	3.7	16.14	59.72	<u>15,229</u>
Total				<u>257,645</u>
Total				<u>\$398,040</u>

a/Includes fringe benefits.

b/Weekday peak service is operated 255 days a year. Other services are operated on Saturdays, Sundays, and holidays.



Two case studies--  
Pittsburgh bus route 68G and the  
Philadelphia Market-Frankford Subway Line

Route 68G

Route 68G is an express bus line operated by the local transit authority--PAT--between Pittsburgh's CBD and Edgewood, a suburban community about 6 miles from the CBD. PAT officials described route 68G as typical of routes that operate between the CBD and areas within the city and close-in suburbs. During the October 1981 period covered by our analysis, PAT operated 10 buses during the morning peak and 9 buses during the evening peak. Two buses provided service during midday.

PAT carried an average of 738 passengers each weekday morning on route 68G during the week of October 19-23, 1981, on trips arriving in the CBD between 6:45 a.m. and 9 a.m. The 15-minute shift from 6:45 a.m. to 9 a.m. from our study times of 7 a.m. to 9:15 a.m. allows 15 minutes for individuals to walk from transit stops to their offices. We found that with ridership arriving evenly in the CBD from 6:45 a.m. to 9 a.m., 68G riders could have been served by 6 buses making 13 trips about 12 minutes apart.

By comparison, during our review period PAT operated 10 buses making 15 trips during the 2-hour, 15-minute period between 6:45 a.m. and 9 a.m., with intervals between trips ranging from 2 to 15 minutes. As shown below, during October 1981 passenger loads averaged 25 to 76 passengers per trip.

<u>PAT Oct. 1981 schedule</u>			<u>Revised GAO schedule</u>		
<u>Bus number</u>	<u>Arrive downtown Pittsburgh</u>	<u>Average passenger load</u>	<u>Bus number</u>	<u>Arrive downtown Pittsburgh</u>	<u>Average passenger load</u>
1	6:51	46	1	6:45	57
2	7:06	55	2	6:56	57
3	7:21	69	3	7:08	57
4	7:36	54	4	7:19	56
5	7:44	53	5	7:31	57
6	7:48	76	6	7:42	57
1	7:59	52	1	7:53	57
7	8:08	47	2	8:04	56
8	8:14	46	3	8:15	57
2	8:20	42	4	8:27	57
9	8:22	36	5	8:38	57
10	8:28	25	6	8:49	56
3	8:37	47	1	9:00	57
4	8:47	35			
5	8:56	55			
<b>Total</b>		<u>738</u>			<u>738</u>

Our schedule eliminated two vehicle trips from PAT's route 68G schedule. We scheduled 57 passengers per bus, the number Pittsburgh transit officials told us they use when establishing peak period bus schedules. At the time of our review, however, buses on route 68G were carrying an average of 49 passengers per trip. Eliminating the two vehicle trips reduced vehicle needs by one bus. Spreading employee work hours over a longer time period reduced vehicle needs by three buses because additional trips could be made with the remaining vehicles.

Similar patterns were revealed when we analyzed PAT's route 68G service departing from downtown Pittsburgh during the afternoon. Using an average of 57 passengers per trip, we found that 7 buses making about 12 trips about 12 minutes apart would have been adequate to provide service for the 682 passengers leaving downtown Pittsburgh on route 68G between 3:45 p.m. and 6 p.m.--again allowing 15 minutes for employees to walk from their offices to 68G bus stops. In contrast, PAT used 9 buses making 14 trips from 1 to 15 minutes apart and carrying an average of from 28 to 74 passengers per trip.

Eliminating three vehicles on route 68G could save \$517,000 based on the nearly \$150,000 per bus that the State of Pennsylvania is currently spending to purchase buses for PAT and to maintain a 15-percent reserve. At current prices, PAT is using \$1.7 million worth of buses to provide service on route 68G.

When we compared the labor costs to operate route 68G under our revised schedule with the labor costs under the schedule used in October 1981, we found that about \$15,000 could be saved annually. We estimated these savings by calculating the difference between operator hours on the existing schedule and our revised schedule. We then multiplied the labor-hour difference by the 1981 wage rate. We believe the labor cost reductions would result mostly from eliminating trips on this route rather than from spreading passenger travel times.

#### Market-Frankford Line

On the Philadelphia subway route, the local authority--SEPTA--used 180 vehicles to provide service during the morning peak period. By spreading ridership evenly over a 2-1/4-hour period, the same level of service could have been provided with 144 vehicles, a reduction of 20 percent. Vehicles for this line were last purchased in the late 1950's. A SEPTA official told us that similar vehicles purchased today would cost between \$850,000 and \$950,000 each. Thus, if SEPTA needed to purchase replacement vehicles for this route, the expense would be reduced by between \$35 and \$39 million. We estimate that spreading peak ridership would enable SEPTA to reduce its fleet for the Market-Frankford Line by 41 vehicles--36 vehicles removed from peak period service plus 5 removed from reserve.

Service on the line was provided at 7-1/2-minute intervals at midday, increasing to 2-minute, 15-second intervals during peak morning and afternoon commuting periods. Twenty-nine six-car trains were used during the morning peak and 30 six-car trains were used in the afternoon. The heaviest passenger loads arrive in the CBD between 8:07 a.m. and 8:17 a.m., and leave between 4:58 p.m. and 5:07 p.m. If the same number of riders could be spread evenly over a 2-1/4-hour period, service could be provided by 22 six-car trains in the morning, arriving at 4-minute intervals and by 24 six-car trains in the afternoon, arriving at 3-3/4-minute intervals.

The peaked nature of ridership on the Market-Frankford Line can be demonstrated by passenger counts made by SEPTA which show the number of passengers carried past the point on the line where the concentration of ridership is the greatest. These counts showed that each morning and evening one 20-minute period accounts for ridership much greater than at other times during the day. For example, passengers pass the peak load point at the rate of 251 passengers a minute on trains leaving the CBD between about 5 p.m. and 5:20 p.m., while the number amounts only to about 54 passengers a minute on trains leaving between about 6:00 p.m. and 6:20 p.m. as shown below.

<u>Times leaving central business district</u>	<u>Number trains</u>	<u>Number passengers carried</u>	<u>Average number passengers per minute</u>
3:50 to 4:20 p.m.	6	2,341	78
4:20 to 4:40 p.m.	6	3,016	151
4:40 to 5:00 p.m.	7	4,270	214
5:00 to 5:20 p.m.	8	5,017	251
5:20 to 5:40 p.m.	5	2,390	120
5:40 to 6:00 p.m.	5	1,655	83
6:00 to 6:20 p.m.	4	1,073	54

SEPTA officials told us that spreading peak ridership would be beneficial because delays in service would not be as crippling as they are now when trains are scheduled close together. Reliability of service would increase. For example, a small delay in train operations when trains are running at close frequencies causes other trains to catch up to the delayed train, people to accumulate at the stations, and severe overcrowding on trains when service resumes.

A 1-3/4-HOUR SPREAD WOULD ALSO  
REDUCE VEHICLE NEEDS

Spreading the peak period evenly over a 1-3/4-hour period would also result in reduced vehicle requirements ranging from 7 to 20 percent on the six transit routes in Philadelphia and Pittsburgh, providing the potential for avoiding nearly

\$17 million worth of vehicle purchases or over \$4 million of costs to rehabilitate subway cars and street cars.

When we were conducting our review, transit officials in Pittsburgh and Washington, D.C., told us that they favored spreading commuter work hours because almost any spread from the current pattern would benefit the transit systems. In making our detailed analysis, we chose a 2-1/4-hour time period because we believed such a spread could be achieved in the two cities and because we believed an even distribution would provide the maximum benefits to the transit systems. However, we wanted to test the impact of another time period to see whether savings would also occur. The test we made of a 1-3/4-hour spread consisted of determining what the peak period vehicle needs would be. We did not determine what the impact would be on labor costs.

We found that reductions in vehicle needs would still occur on five of the six routes analyzed, although the reduction would be less than if work hours were spread over a 2-1/4-hour period. The changes in vehicle requirements on the six routes would be as follows.

	Maximum number of vehicles required			Percent reduction
	Peaked distri- bution	Even distri- bution	Difference	
Philadelphia:				
Market-Frankford Line	180	168	12	7
Route 59	12	10	2	17
Route 66	25	23	2	8
Route 75 <u>a/</u>	9	-	-	-
Pittsburgh:				
Route 42/38	25	20	5	20
Route 68G	10	8	2	20

a/We did not modify the schedule on this route because peaked ridership did not occur.

The 1-3/4-hour spread would provide the largest potential for savings on the Market-Frankford Line, with potential for avoiding \$12 million in subway car purchases when the current vehicle fleet needs to be replaced. For all six routes, a 1-3/4-hour spread provides the potential for avoiding the purchase of nearly \$17 million worth of vehicles.

	Number vehicles eliminated from schedule (note a)	Current replacement cost per vehicle	Sub- total	Reserve require- ments (note a)	Total
Philadelphia:					
Market- Frankford Line	12	\$900,000	\$10,800	\$1,620	\$12,420
Route 59	2	150,000	300	45	345
Route 66	2	150,000	300	45	345
Route 75	0	-	-	-	-
Total			<u>11,400</u>	<u>1,710</u>	<u>13,110</u>
Pittsburgh:					
Route 42/38	5	575,000	\$2,875	\$ 431	\$ 3,306
Route 68G	2	150,000	300	45	345
Total			<u>3,175</u>	<u>476</u>	<u>3,651</u>
Total			<u>\$14,575</u>	<u>\$2,186</u>	<u>\$16,761</u>

a/An additional 15-percent fleet reduction would be possible above those removed from the transit schedule because reserve requirements for the time when vehicles are undergoing repairs and maintenance would also be reduced. For example, on the Market-Frankford Line, about 14 vehicles could be removed from the fleet (12 from scheduled service plus 2 from reserve requirements.)

Because vehicle needs would be reduced, PAT and SEPTA would also have the option of rehabilitating fewer subway cars and street cars. The potential to avoid rehabilitation costs would amount to over \$2.7 million on the Market-Frankford Line and over \$1.4 million on route 42/38.

POTENTIAL IMPACT OF  
SPREADING AND SMOOTHING  
THE PEAK IN PHILADELPHIA

SEPTA provides transit service in Philadelphia and nearby suburbs in Pennsylvania. The transit system must maintain many vehicles because demand rises during the peak commuting periods. The chart below shows SEPTA's vehicle needs during the peak and mid-day periods.

<u>Vehicle type</u>	<u>Morning peak period</u>	<u>Mid-day</u>	<u>Evening peak period</u>
Rail rapid	258	138	263
Motor bus	1,074	500	1,082
Streetcar	173	91	174
Trolley bus	69	29	78

SEPTA is currently rehabilitating the vehicles used on the Market-Frankford Line and does not plan to purchase vehicles for the line for at least 10 years. SEPTA has completed rehabilitation of 26 cars and plans to rehabilitate the entire fleet of 250 vehicles at a cost of about \$200,000 per vehicle. If work hours were spread in Philadelphia so that fewer vehicles would be needed, SEPTA would have the option of rehabilitating 41 fewer vehicles at a savings of over \$8 million. SEPTA anticipated obtaining grants from UMTA to pay for 80 percent of the rehabilitation costs.

SEPTA recently purchased 141 streetcars at a cost of \$570,000 to \$575,000 each. However, the remaining fleet is dilapidated and SEPTA has a program underway to rehabilitate about 110 cars. The need for streetcars is affected by the working hours of persons in the CBD. Spreading work hours over longer time periods would most likely reduce equipment needs on several of these routes. SEPTA might be able to reduce its needs for rehabilitating streetcars and ultimately avoid future purchases of vehicles to replace the rehabilitated fleet.

SEPTA uses over 1,000 buses to provide peak service. A fleet of 285 buses was acquired in 1980, and SEPTA anticipates purchasing 750 buses from 1981 to 1985. Buses recently ordered for SEPTA by the State of Pennsylvania, using Federal, State, and local government funds, will cost up to \$150,000 each. Reducing peak requirements could result in immediate savings in bus purchase costs.

Because of the way vehicles and operators are assigned to transit routes, we were not able to make statistically valid projections of the impact of spreading work hours on the Philadelphia and Pittsburgh transit systems. However, we chose surface routes for analysis that were similar to others operated by SEPTA so that our review would provide an indication of the broader implications that spreading work hours would have on SEPTA, PAT, and other transit systems.

The three bus routes we selected for analysis in Philadelphia used over 2.2 times as many vehicles during the peak periods as were required during the midday period. SEPTA's City Division operates 22 other bus routes that required 2.3 or more times as many buses for the morning peak as for the midday period. These

routes required a total of 403 buses for morning peak period service. An additional 60 buses were needed for times when repairs and maintenance were being performed.

SEPTA officials remarked that if money could be freed annually from vehicle purchases, it could be used in many other ways; for example, on improved maintenance operations. SEPTA has approximately 1,400 buses, although its major maintenance garage was built to handle a 1,000-bus fleet. SEPTA is having some difficulty locating a site for a new garage, but officials speculated that if the fleet size were sufficiently reduced, the new garage might not be needed.

SEPTA officials also remarked that it did not appear that maintenance costs would change much. Spreading work hours would result in the need to operate each vehicle more miles, thus increasing maintenance costs for individual vehicles. However, because the number of vehicles in the fleet could be reduced, there would be fewer vehicles to maintain.

POTENTIAL IMPACT OF  
SPREADING AND SMOOTHING  
THE PEAK IN PITTSBURGH

PAT serves the city of Pittsburgh and surrounding communities as the principal provider of transit services by operating a network of about 170 bus and streetcar routes. Approximately 380 vehicles were used to provide midday service, while about 840 vehicles were needed for the morning peak. About 180 additional vehicles are in the fleet to replace those undergoing repairs and maintenance.

PAT does not plan to purchase streetcars similar to those now in use on route 42/38. It is in the midst of constructing a subway line in downtown Pittsburgh and will be reconstructing the 42/38 streetcar line track for use by 55 new light rail vehicles plus 45 rehabilitated streetcars. In July 1982 bids were accepted for new vehicles that will cost nearly \$900,000 each. The new vehicles will be able to carry more passengers than the existing streetcars. Therefore, spreading peak ridership on the route might not have reduced vehicle requirements by the same number that we identified, but savings of nearly \$900,000 for each light rail car eliminated would have occurred.

Spreading peak ridership in Pittsburgh would provide the potential for reducing vehicle needs on the other streetcar routes as well. Pittsburgh's existing fleet of streetcars was acquired in 1947 or earlier and has deteriorated considerably. Over the next several years, PAT plans to rehabilitate up to 45 of the existing vehicles and to use them on the subway routes.

A PAT official estimated that the rehabilitation will cost \$250,000 per vehicle. PAT anticipated that 80 percent of the rehabilitation costs will be borne by the Federal Government through grants provided by UMTA.

We did not attempt to project the total number of buses that would be saved systemwide because the characteristics of each route could make a projection from our two examples misleading. In all probability, however, the spreading of peak ridership could reduce vehicle requirements on many other routes as well. Any reductions in buses would have an immediate impact as PAT is purchasing 400 new buses at over \$150,000 each beginning in September 1982 with deliveries continuing for several years.

PAT's Director of Planning Development and Public Services voiced concern that it is unlikely that a program to spread employee work hours would be able to achieve a distribution of arrivals and departures evenly over a 2-1/4-hour period. While he strongly supported variable hours programs, he expressed concern that overly optimistic claims were being made about the capital and/or operating cost savings.

We advised him and other PAT officials that we realized the improbability of a pattern of absolutely even ridership occurring. However, our study shows the potential for savings that would result from a program that tries to flatten the distribution of worker arrivals and departures. We also advised him that no program had yet tried to spread working hours over a period as long as 2 hours, 15 minutes. Therefore, it is difficult to estimate the actual amount of flattening that could occur from a program. Furthermore, we found that, when given the flexibility, some persons will choose starting times earlier than 7 a.m. or later than 9:15 a.m. In the evening, some persons will leave outside the 2-hour, 15-minute time period we used in our study. If commuting hours were extended beyond the range projected in our study, even greater benefits might occur to the transit authority than we had estimated.

PAT officials estimated that it would take about two persons working full-time to run an effective program to encourage the spreading of work hours in Pittsburgh's CBD. The Director estimated that it would cost about \$60,000 annually to pay the salaries and fringe benefits to operate a program.

In view of the potential for savings that is involved, we believe it would be worthwhile for a program to be undertaken. Any savings that would occur would ultimately benefit the Federal, State, and local government agencies that are contributing to PAT's financial support.

The Director was also concerned that the 20-percent and greater reduction in equipment needs and operating costs that we identified on the two routes studied in Pittsburgh and elsewhere would not occur systemwide.



We realize that the total amount of savings is not predictable and would not be the same on all routes in the system. However, peaking does occur to varying degrees on most of PAT's routes and there is potential for reductions in vehicle needs.

#### NATIONWIDE IMPLICATIONS

For practicality, we limited our review to six transit routes in Philadelphia and Pittsburgh. We believe that the routes we selected are representative of other transit routes in Philadelphia, Pittsburgh, and other cities. The savings potential, we believe, could also occur to varying degrees on other transit routes.

It is expected that UMTA will be providing transit systems about \$4 billion annually for capital and operating purposes through fiscal year 1986.

Nationwide, about 7,500 subway vehicles are needed to provide peak period service in Atlanta, Boston, Chicago, Cleveland, New York, Philadelphia, San Francisco, and Washington. New systems are under construction in Baltimore and Miami.

Nationwide, nearly 43,000 buses are used to provide peak period service. Buses are used in every major urban area, with almost 35,000 used in the 25 largest urban areas. Large cities should replace a portion of their bus fleet almost every year. Therefore, a program of spreading work hours could result in savings in purchases of buses soon after changes in work hours are made. Recently, buses have been purchased at costs of about \$150,000 to \$165,000 each.

Of the four bus routes we analyzed, three showed a potential for reductions in vehicle requirements of between 8 and 30 percent. The nature of bus routes is much more diverse; therefore, the results we obtained on the four routes are not indicative of all bus routes. But, Philadelphia, Pittsburgh, and other large cities have bus routes similar to those we studied.

Streetcars and light rail vehicles are operated in Boston, Cleveland, Newark, Philadelphia, Pittsburgh, San Diego, and San Francisco. Systems are under construction in Buffalo and Portland, Oregon. In 1981 about 550 vehicles were used for peak period service. Recently, vehicles have been purchased at prices from \$570,000 to nearly \$900,000 each. Transit systems purchase light rail vehicles infrequently, but the costs per vehicle are high. Our study did not provide a basis for making a nationwide estimate of the potential for vehicle reductions in the cities operating light rail lines, but we believe that the potential for reductions exists.

Spreading work hours would have impacts other than affecting requirements for transit vehicles. For example, travel patterns on urban streets and highways would change, the times

persons conduct their leisure activities and the times spent with their families would also change.

In addition, obtaining long spreads of employee work hours would require significant changes in the times some persons work. Many persons would resist big changes to their existing work hours. Therefore, several small changes might be needed. If the changes would be made at intervals several years apart, a number of years would be needed to achieve spreads such as 2-1/4 hours.

## CONCLUSIONS

UMTA provides large amounts of funds to transit systems for purchasing and rehabilitating vehicles and for operating expenses. Because of the savings we identified on the six routes in Philadelphia and Pittsburgh and the similarities between the transit systems in those and other cities, we believe there is potential for reducing vehicle requirements in a number of transit systems.

## AGENCY COMMENTS AND OUR EVALUATION

DOT, in its September 9, 1982, letter (app. VII), commenting on our draft report, states its agreement that there are benefits to be gained by spreading the peak. However, it suspected that we may be overly optimistic in our estimates given a review only of the Philadelphia area. It believed that transit entities should investigate the alleviation of peak hour congestion and equipment requirements through flexible scheduling.

PAT, in its August 17, 1982, letter (app. VIII), commenting on our draft report, stated that last year it put on a campaign to encourage downtown businesses to adopt flexible work-hour programs. It said that the results of the campaign have been marginal thus far; nevertheless, PAT's hypothesis is similar to ours--flexible work hours have the potential for reducing transit costs. PAT found no problems with the detailed information and methods we used to test various alternatives; however, it felt that our basic assumption that arrivals and departures would be uniformly distributed over 2-1/4-hour periods results in overly optimistic savings in capital and operating costs.

Both DOT and PAT agreed that spreading commuter work hours would result in savings in transit costs. The question is, how much will those savings be.

As discussed in the scope and methodology in chapter 5, when we were planning our review we discussed our objectives with the Chief, UMTA Office of Paratransit and Special User Group, who suggested that two cities would be sufficient for our analysis--a city that has a subway system and a city that relies totally or principally on surface transit routes. This approach, we were told, should be sufficient to demonstrate

the principles we wanted to illustrate. Because of these suggestions, we selected Philadelphia and Pittsburgh to make our analyses. We believe the analyses we did fairly represent the impact changing work hours could have on transit systems where peaking is a problem.

As also discussed in chapter 5, we estimated the cost impact of a 2-1/4-hour flat distribution to demonstrate an example of the potential type of savings that work spreading could achieve. We believe more or less savings could be achieved depending on the time period over which work hours could be spread and the amount of flattening that could be achieved. Our savings estimates are intended only to show the savings that may be achieved.

SEPTA, in its September 17, 1982, letter (see app. IX) commenting on our draft report, states that it does not control the work or traveling times of its passengers. It stated that the observations we made about peak ridership represent a problem that has affected the economics of public transportation for more than 100 years. It believed we should make clear in our report that the changes we are recommending are not within the management control of the transit operators.

We are aware that the transit operators and others involved in variable work hours programs have had little or no control over the work hours of commuters. Yet, as we discuss in chapter 3, variable work-hours programs have been successful in achieving changes in commuters' work hours. Past programs have demonstrated that the lack of control over commuters' work hours is not essential to achieve changes in work hours.

SEPTA also said that it cannot verify the accuracy of our schedule computations. It said that while it had provided us advice and assistance, it did not have control over the computations or methods we used. SEPTA also said that the schedules we prepared were not subjected to the proofs that are normally employed to verify its own work. It mentioned the need for our schedule to conform with all provisions applicable to labor agreements.

When we made our analysis we considered the running times, number of passengers carried, vehicle capacities, and the labor provisions applicable to each route. These are the same factors that SEPTA considers when developing transit schedules. While SEPTA may not have subjected its reviews of our schedules to the same exactness that it employs when developing transit schedules for actual use, it told us during our review that the schedules we had developed were reasonable.

SEPTA also commented that it did not attempt to verify the base data presented in our report regarding existing conditions. It said that the data generally appears to be correct, although it suspected that the suburban division street car requirements had been omitted from the table on page 2-6 (p. 16 in this report). After receiving the comments from SEPTA, we confirmed

that the data we cited on page 16 does include suburban street car lines.

SEPTA also believed that there was an arithmetic error regarding route 59 in the report draft. This was a typographical error that has been corrected in the final report.

SEPTA commented that if our plan for spreading the peak period were to be adopted, it would recommend operating a higher level of service during the extended peak. This would be wise, it said, to increase the quality of service (level of comfort) as an inducement to shift hours.

We recognize that transit systems would have the option of retaining vehicles and using them for additional trips. Although this option would not result in the savings we demonstrated in this report, benefits in the form of higher quality service would result for the transit rider.

SEPTA stated also that peak vehicle requirements at many of its garages (although not the ones in our study) are determined by the transportation needs of school children. It said that at several SEPTA locations, more vehicles are needed in the early afternoon at school dismissal time than at any other time during the day. SEPTA said also that it has repeatedly tried to get the school district to spread opening and closing times to reduce this problem but the school district has been totally unresponsive and is vigorously opposed to the suggestion. It said that the spreading of general travel hours would not achieve any real operating economies unless the school problem is resolved.

SEPTA's efforts to spread the times at which school children ride its vehicles recognizes the fact that spreading ridership can alleviate the problem of peaked transit demand. It is evident from the SEPTA response that if vehicle requirements are to be reduced in Philadelphia, continued emphasis is needed to alter school dismissal times. 1/

SEPTA also commented that the peaking problem has been made worse over the past two decades by large-scale highway construction, 90 percent of which has been funded by the Federal Government, funded by 90 percent Federal capital money. The highway program has completely changed development and land use patterns. Many former midday transit riders, SEPTA said, have left the transit systems because they have been lured to suburban lifestyles through the availability of fast highways.

We did not include a determination of the highway program impact on transit systems in the scope of our study because we were concerned only with how existing ridership patterns could be changed.

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1/The times that children were dismissed from schools in Pittsburgh did not cause peaking problems.

## CHAPTER 3

### GREATER SPREADING OF COMMUTER

#### WORKTIMES IS ACHIEVABLE

Many employers and employees in the Philadelphia and Pittsburgh CBDs are willing to change their work hours to earlier or later than the busiest period of the peak. Most employers using variable work hours reported a positive effect or no change on a wide range of employee and organizational factors we asked about. Employees at one firm with flexible hours reported favorable effects on commuting, work, and personal factors. We believe enough potential exists to change people's worktimes to realize the savings described in the previous chapter.

Several cities, including Philadelphia, have had programs to spread work hours. While these programs were not aimed at spreading hours as much as we propose, they did demonstrate that employers and employees can be persuaded to change their work hours.

#### SOME EMPLOYERS USING FIXED WORK SCHEDULES SHOWED WILLINGNESS TO CHANGE WORK HOURS

Some organizations using fixed work hours indicated they plan to change their work hours. Sixteen percent thought it was likely they would adopt a variable work-hours program in the next 3 years. However, 53 percent of the organizations reported they plan to remain on fixed schedules. The balance were uncertain or had no basis to judge whether they would change work hours.

We asked organizations that used fixed work hours how difficult or easy would it be to shift employee starting times by 15 minutes to 60 minutes earlier or later. Over half of these organizations reported that at their largest CBD employment locations they could shift their starting times up to 30 minutes earlier easily or with no impact on their operations. Organizations indicated less ability to change work hours 45 minutes or more earlier, yet about 15 percent reported they could make a change 45 minutes or more earlier easily or with no impact on the organization.

Fixed-Work-Schedule Employer Ability To  
Change to Earlier Work Hours

<u>Number minutes earlier</u>	<u>Difficult</u>	<u>No impact</u>	<u>Easy</u>	<u>Total</u>
	----- (percent) -----			
15	29	28	43	100
30	47	18	35	100
45	84	4	12	100
60	86	4	10	100

Organizations also seem willing to change to later working hours. Of those organizations that responded, 65 percent said they could move 15 minutes later; 47 percent 30 minutes later; 20 percent 45 minutes later; and 17 percent 60 minutes later, as shown below.

Fixed-Work-Schedule Employer Ability To  
Change to Later Work Hours

<u>Number minutes later</u>	<u>Difficult</u>	<u>No impact</u>	<u>Easy</u>	<u>Total</u>
	----- (percent) -----			
15	35	27	38	100
30	53	16	31	100
45	80	7	13	100
60	83	4	13	100

These results demonstrate that some employers plan to adopt variable work-hours programs and others, who choose to retain fixed work schedules, could still make changes to starting and quitting times. The potential exists for a considerable amount of change in work hours.

Organizations reported that employee desire is the greatest incentive to adopt a variable work-hours program. Another influential factor is the use of variable work hours by other organizations in the same line of business. It appears that learning about employee opinions and coordinating a program with firms in a similar line of business would be useful strategies to encourage organizations to change their work hours.

EMPLOYEES ON FIXED SCHEDULES PREFER  
A WIDER RANGE OF STARTING AND FINISHING TIMES

Most employees on fixed work hours at the two organizations we surveyed showed a willingness to change their work hours if permitted by their employers. These employees were starting work between 8 a.m. and 8:30 a.m. and stopping work between 4:30 p.m. and 5 p.m.

Employees showed an interest in starting work much earlier and later than at present. For example, 30 percent reported they would probably start by 7 a.m. and 31 percent reported they would probably start at 9 a.m. Even shifts of an hour or an hour and a half had adherents. Six percent would probably start by 6:30 a.m. and 11 percent would start at 9:30 a.m.

Respondents also showed a willingness to make substantial changes in the times they would stop work at the end of their workdays. For example, if given the opportunity to choose their own work hours, 21 percent said they definitely would choose to finish work at 3:30 p.m. and 25 percent said they would probably work until 5:30 p.m. The various times outside the peaks at which employees were willing to start and stop work are shown on page 26.

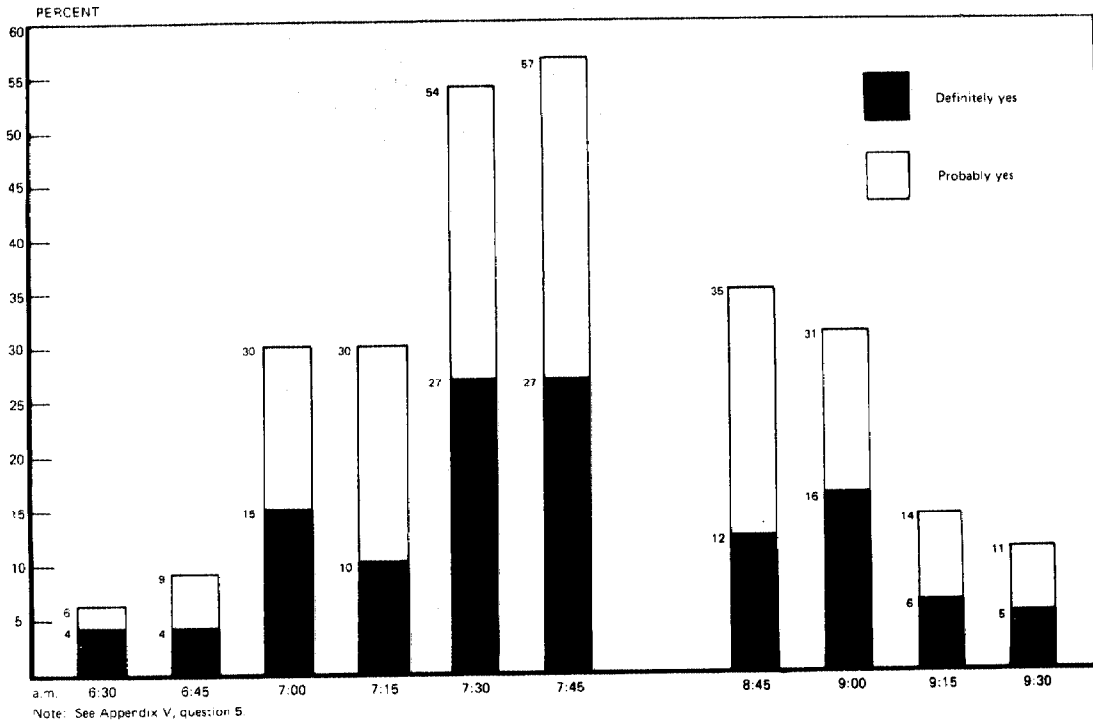
In order to achieve a flat distribution of ridership over a 2-1/4 hour period, at least 10 percent of the commuters would need to start or stop work at each of the proposed starting and stopping times, i.e., 7 a.m., 7:15 a.m., etc. The questionnaire results showed that more than 10 percent of the employees were willing to start or stop work at each of the times that would be needed to achieve a flat 2-1/4 hour distribution. This indicates to us that there is potential for achieving a flat distribution of ridership over the 1-3/4- and 2-1/4-hour periods used as a basis for our estimates.

Employees said they would be influenced most to change their work hours by the ability to earn time off and to match work hours with personal or family situations. To accommodate these preferences would require work-hour programs that permit compressed work weeks and some variability in starting and stopping times.

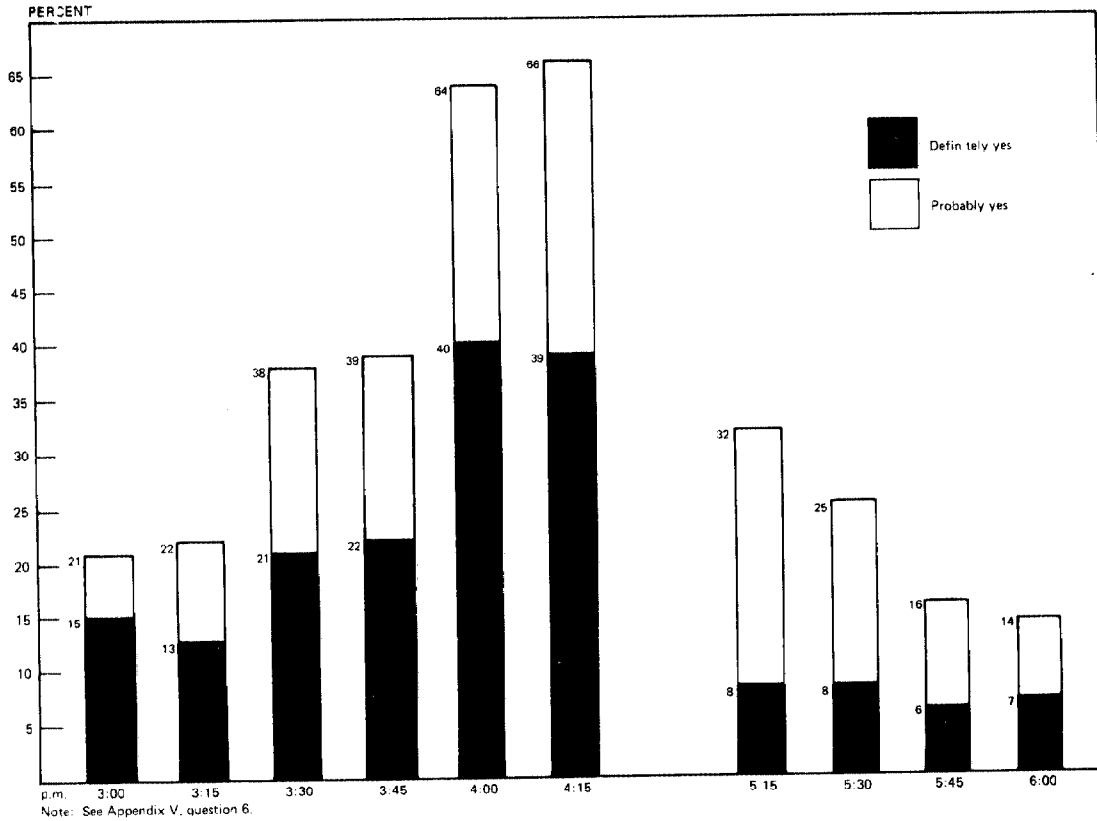
EMPLOYEES ON FLEXIBLE HOURS CHOSE A WIDE  
RANGE OF ARRIVAL AND DEPARTURE TIMES

The employees on flexible work hours at the firm we surveyed chose a wide range of arrival and departure times from the CBD. Arrival times during the morning were at a fairly smooth distribution from 7:01 a.m. to 8:30 a.m. About 80 percent of employees arrived at work between these times. The period from 7:46 a.m. to 8 a.m. was the most popular arrival time, yet only 18 percent of the total arrived then.

**TIMES OUTSIDE THE MORNING PEAK EMPLOYEES WERE WILLING TO START WORK**



**TIMES OUTSIDE THE EVENING PEAK EMPLOYEES WERE WILLING TO STOP WORK**





The range of time during which employees departed from work showed a slightly greater spread than morning arrivals. Between 4:16 p.m. and 6:00 p.m., 77 percent of employees left downtown. The busiest 15-minute period was from 5:16 p.m. to 5:30 p.m., when 17 percent of the employees left. (See p. 28.)

One employer's variable work program allowed employees to start work between 7 a.m. and 9 a.m. and to stop work between 4 p.m. and 5:30 p.m. When the company was on fixed hours, all employees were required to arrive at 8:30 a.m. and leave at 5:30 p.m. At the time we surveyed the employees, only 12 percent were arriving for work in the 15-minute period preceding 8:30 a.m. and only 13 percent were leaving work in the 15-minute period after 5:30 p.m.

Employees reported very favorable results from the variable work-hours program. Over 70 percent reported a favorable impact on their personal or family life. Sixty-six percent said their morale was favorably affected and over 50 percent reported a favorable impact on commuting time.

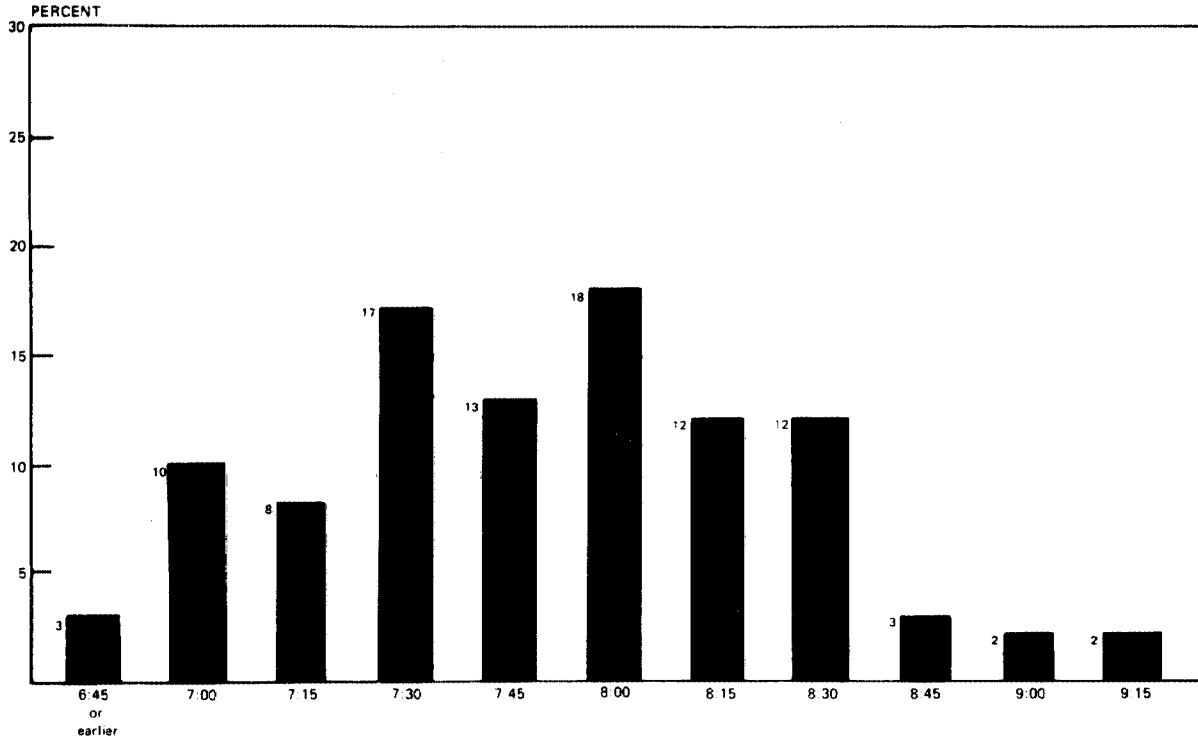
VARIABLE WORK HOURS ARE  
WIDELY USED AND SUCCESSFUL

About 45 percent of the employers in both cities were already using some form of variable work hours; more than half reported using staggered hours. These firms employed about 60 percent of the employees working for firms in our survey. Firms in practically all lines of business use variable work hours, and half of the firms started the programs before 1975.

Organizations in both cities reported that variable work schedules had a favorable effect on a number of employee and organizational factors. For example, 41, 38, and 31 percent, respectively, said that employee commuting, servicing customers, and employee morale were very favorably affected.

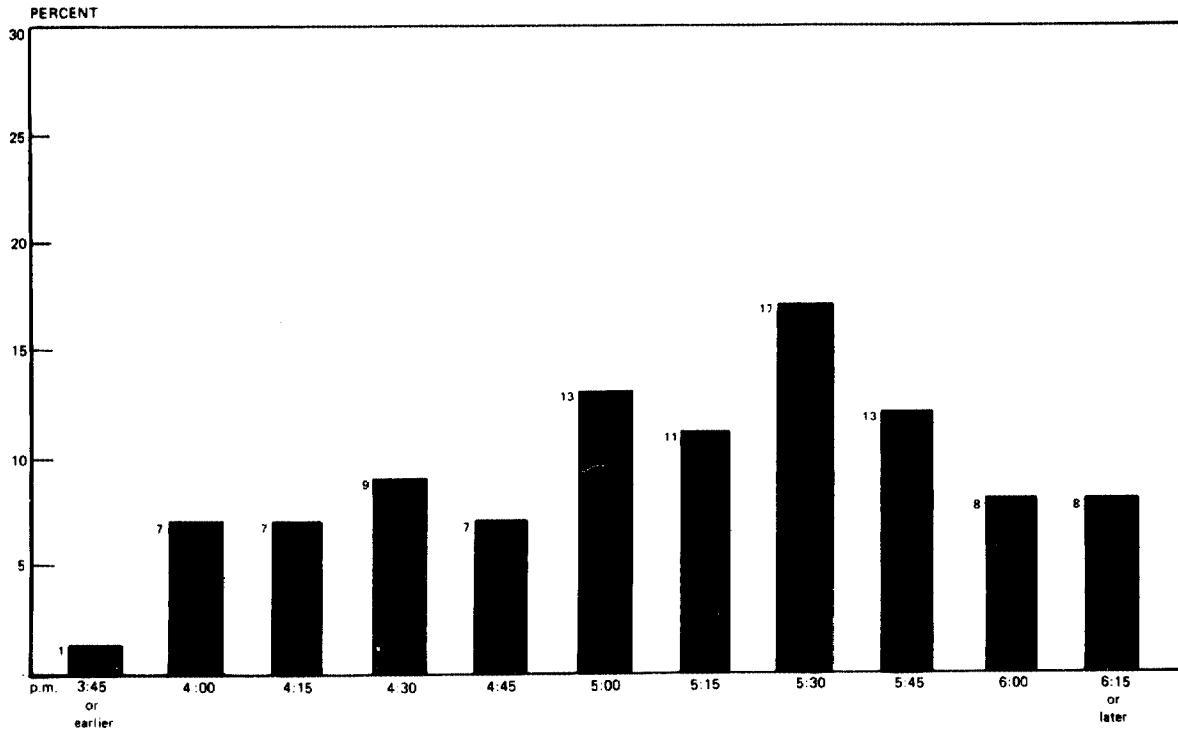
Of the 16 factors we asked about, organizations reported a higher than 10-percent unfavorable impact on only two factors. Thirty-eight percent of the organizations reported problems with providing adequate supervisory coverage, and 26 percent said they had problems maintaining inter- and intraoffice communications. The complete results for these factors are shown on page 29.

**TIMES FLEXIBLE--SCHEDULE EMPLOYEES ARRIVED IN DOWNTOWN PITTSBURGH IN THE MORNING**



Note: See Appendix VI, question 2.

**TIMES FLEXIBLE--SCHEDULE EMPLOYEES DEPARTED FROM DOWNTOWN PITTSBURGH IN THE EVENING**



Note: See Appendix VI, question 2.

Effect of Variable Work Hours on  
Various Employee and Organization Factors

<u>Factor</u>	<u>Unfavorable</u>		<u>Little</u>	<u>Favorable</u>		<u>Not</u>
	<u>Very</u>	<u>Somewhat</u>	<u>or</u> <u>none</u>	<u>Somewhat</u>	<u>Very</u>	<u>considered</u> <u>or don't</u> <u>know</u>
	----- (percent) -----					
Recruiting employees	-	-	38	34	15	13
Retaining employees	-	2	34	34	8	21
Maintaining employee productivity	-	3	23	41	16	16
Maintaining employee morale	-	2	23	34	31	10
Maintaining employee/ management relations	-	7	26	31	25	12
Ensuring employees report on time	-	10	36	28	18	8
Ensuring daily attendance	-	5	46	23	18	8
Facilitating employee commuting	-	5	18	30	41	7
Servicing customers	-	5	34	15	38	7
Maintaining inter-/intra- office communication	-	26	39	18	8	8
Affecting overtime costs	-	2	53	23	18	5
Utilizing equipment effectively	-	-	38	36	21	5
Utilizing utilities effectively	2	5	44	25	12	13
Providing adequate supervisory coverage	-	38	33	15	12	3
Maintaining payroll/ timekeeping records	3	8	64	8	7	10
Maintaining organizational efficiency/profitability	-	7	31	25	26	12

Despite the use of variable work hours, the starting and finishing times for firms in our survey still showed a peaked pattern. In both cities over 70 percent of employees reported to work between 8 a.m. and 9 a.m. and in the afternoon 65 percent or more of employees finished work between 4:30 p.m. and 5:15 p.m.

The organizations reported that nearly 5,500 employees, or 13 percent, who now report between 8 a.m. and 9 a.m. could report before 7:45 a.m. without hurting operations and that about 4,500, or 10 percent, could report after 9:15 a.m. These responses demonstrate that organizations now using variable work schedules could spread their work hours more.

FARE REDUCTIONS CAN BE AN INCENTIVE  
FOR EMPLOYEES TO CHANGE THEIR  
WORK HOURS FROM PEAK PERIODS

Fare reductions are an incentive for employees to change their starting times from the peak period. However, fare reductions of more than 10 percent apparently would not draw additional employees in proportion to the fare reductions.

We asked employees on fixed hours whether a lower fare would influence them to start work before 7:30 a.m. or after 9 a.m. For those on flexible hours, we only asked about starting before 7:30 a.m. because the firm surveyed required everyone to start by 9 a.m. and did not want us to ask about later starting times.

Of the employees on fixed work hours using mass transit, only 12 percent said they would change their starting time to before 7:30 or after 9 a.m. if there were a 10-percent fare reduction. A decrease in fares by 30 percent increased to 23 percent the number of employees stating they would definitely change their starting times. The results of our questions on fare reductions are summarized below.

Employees on Fixed Hours  
Using Mass Transit Who  
Stated They Would Report to Work  
Before 7:30 a.m. or After 9 a.m.

<u>Percent fare reduction</u>	<u>Definitely</u>	<u>Probably</u>	<u>Total</u>
	----- (percent) -----		
10	11.7	12.9	24.6
20	14.2	21.9	36.1
30	22.7	30.1	52.8
40	39.4	30.9	70.3
50	56.0	25.7	81.7

Nearly 28 percent of the mass transit users on flexible work hours reported that they would definitely start by 7:30 a.m. if there was a 10 percent fare reduction. However, additional fare reductions only resulted in a modest increase in those definitely willing to start by 7:30 a.m. Reducing fares another 40 percent adds only 18 percent to the original 28 percent obtained from the first 10-percent reduction.

Employees on Flexible Hours  
Using Mass Transit Who  
Stated They Would Report to  
Work Before 7:30 a.m.

<u>Percent fare reduction</u>	<u>Definitely</u>	<u>Probably</u>	<u>Total</u>
	------(percent)-----		
10	27.9	7.4	35.3
20	31.3	8.2	39.5
30	33.3	15.6	48.9
40	38.8	17.7	56.5
50	45.6	16.3	61.9

The questionnaire results showed that providing fare reductions could be used as an incentive to get employees to change their work hours. For the employees at the three companies where we sent questionnaires, the impact of fare reductions varied between those persons on fixed work hours and those who were already on variable work hours. We do not know the reasons for the differences between their responses or how representative their responses were of the opinion of employees at other organizations. However, it could be that employees on variable work schedules (1) are already used to changes in work hours and are amenable to additional changes and (2) already have work times that would not require as much change as those on fixed schedules.

Before fare reductions should be used as an incentive, however, the transit system should weigh the benefits of having commuters ride at times different than now with the revenue reductions that would occur.

VARIABLE WORK-HOURS PROGRAMS  
HAVE INDUCED EMPLOYERS AND  
EMPLOYEES TO CHANGE WORK HOURS

Several cities have conducted programs to spread peak ridership. The results of the programs in four cities--Boston, New York, Philadelphia, and Seattle--are discussed below. These programs were successful in spreading ridership from the busiest period but did not have as an objective spreading ridership over an established period, such as 2-1/4 hours. The results of all the programs demonstrate that peak ridership patterns can be changed when the problem receives the concerted attention of transit authorities, local governments, employers, and employees. Only Seattle's program is still active.

## Boston

In 1977 the four main subway lines of the Massachusetts Bay Transportation Authority (MBTA) suffered from overcrowding. The evening rush hour lasted 2 hours, from 4 p.m. to 6 p.m., peaking between 4:45 and 5:30 p.m. An MBTA brochure pointed out that each of the MBTA's four main lines is capable of carrying a maximum number of vehicles during a given period of time.

"Once the maximum is reached, there is no possible way of adding more equipment without seriously jeopardizing safety."

The brochure said that during the evening peak period demand exceeds MBTA's capacity to provide service:

"This situation exists to some degree wherever there are large employers whose workers all leave at the same time. It is especially critical at four MBTA stations."

An MBTA official said further that, according to projections for 1980, ridership would increase because of extension of some lines.

Therefore, MBTA in 1977 began a program to promote variable work hours in Boston as the only cost effective way of handling the increasing transit ridership. MBTA wanted to reduce the congestion during the evening 3/4-hour peak. The authority was operating full evening rush-hour service for 2 hours. Boston's program was intended to spread the demand for transit to the underutilized times before and after the peak and reduce the costs for overtime or for additional operating personnel to meet the peak demand.

MBTA sent CBD firms a report explaining the advantages of shifting schedules and invited the firms to a June 1978 conference. Media support for variable work hours was strong. The promotion effort persuaded 280 firms representing 84,000 employees to participate.

A June 1980 evaluation of the variable work-hours program found that, from 1976 to 1980, peak demand at four main subway stations had spread by from 21 percent at Government Center to 46 percent at Arlington. The peak evening period spread from 4:15 p.m. to 5:45 p.m. Because of the program, even with increasing ridership, MBTA did not reschedule any of its subway or bus lines. In 1981 MBTA was operating with the same intervals between vehicles as before the variable work hours programs, but with demand for service spread out more evenly.

In June 1982 an official involved with the program advised us that employees who changed their work hours have remained on the spread worktimes. He was not aware of any instances where

organizations required their employees to revert to their former work hours.

### New York City

The largest staggered hours program was that begun in New York in anticipation of increased traffic congestion in lower Manhattan after the construction of the World Trade Center's twin towers. The Port Authority of New York and New Jersey and the Downtown-Lower Manhattan Association initiated the staggered hours program in April 1970; it was expanded to midtown Manhattan in 1972. The goal of the program was to ease problems related to the journey to and from work by persuading organizations to voluntarily alter work schedules away from peak commuting times.

The staggered work-hours project distributed work schedule surveys to firms. If the surveys revealed unusual concentrations of starting or quitting times, the project would try to persuade the company officers to alter the work schedule. When the project was being planned, lower Manhattan had a weekday employee population of 450,000. Some 65 percent of them started work at 9 a.m. and quit at 5 p.m.

Staggered hours in this program meant changing work schedules by at least 1/2-hour either earlier or later than the customary 9 a.m. to 5 p.m. The project would prepare several staggered-hour work schedules for each participating company and inform the company about how staggered hours worked out for other companies. Most of the participating firms were in banking and insurance, and nearly all were nonunion.

As of 1974 the program had enrolled more than 220,000 workers--11 percent of the work force--employed in over 400 organizations in Manhattan. By 1972 the lower Manhattan project had reduced the peak commuting loads at three of the busiest subway stations by 26 percent, with a corresponding 24-percent increase in passengers outside the peak. The program cost about \$455,000. Employees of some firms adopting staggered hours were surveyed later about the changed work hours. Employees who worked a new schedule under the project were asked to compare their commuting experience on the old and the new schedules; 46.8 percent were more satisfied with commuting on the new schedules.

A Port Authority official advised us in June 1982 that the organizations that changed their work hours have remained on the new work times. The spread of worktime arrivals and departures has continued.

### Philadelphia

In the early 1970's, Philadelphia's Chamber of Commerce and the metropolitan planning organization jointly promoted a staggered work-hours program for large downtown firms. The

program, funded jointly by the Federal Highway Administration and UMTA, was intended to save commuters' time, improve SEPTA's efficiency, and spread out peak demand for transit. The program's aim was to reduce demand for transit during the two peak 15-minute periods of the evening rush hour by shifting riders to the adjacent periods. After an intense promotional campaign, 47 firms took part in the program. Neither SEPTA nor the planning organization tried to estimate transit cost savings because economy was not a program objective. Over 40,000 persons made changes to their work hours, helping to relieve crowding on the transit system during the peak. SEPTA believed that the program did not significantly affect costs or revenues.

A planning organization official told us in June 1982 that the work-hours changes made during the early 1970's are still in effect.

### Seattle

The Seattle-King County area had a peaking problem with heavy traffic congestion directly related to the fixed work schedules of most commuters. About 110,000 people are employed in Seattle's CBD. Some 62 percent of Seattle's downtown employees commute by bus and 34 percent by automobile.

The Puget Sound Council of Governments in the mid-1970's asked the Commuter Pool, a unit of the Seattle city government, to evaluate variable work hours as a way of reducing traffic congestion in the Seattle-King County area. According to the Commuter Pool, the Seattle-King County Transit Authority, to accommodate the peak-hour demand, must employ more drivers and acquire and maintain more buses than can be used effectively during nonpeak hours. Peak hour demand must be balanced against limited resources for mass transit. As a result buses are overloaded during commuting hours, which discourages use of public transit.

Commuter Pool surveyed businesses to find out how work schedules are related to peak-hour congestion. The surveys showed that in the Seattle CBD, more than 80 percent of the employees started work between 8 a.m. and 8:30 a.m. and quit work between 4:30 p.m. and 5 p.m. These concentrations of start and stop times were closely correlated to periods of traffic congestion. The Commuter Pool decided that traffic congestion could be reduced by changing the work schedules of enough workers and recommended a variable work-hours program.

About 1975 the Commuter Pool initiated a variable hours program to encourage voluntary work schedule changes. Some 110 firms in the CBD, employing about 60,000 people, came to the Commuter Pool for assistance in implementing flexible work hours. The program was funded by the Federal Aid to Urban Systems--funds which accrue to the region from the Federal Highway Trust Fund.



In the fall of 1979, a study of the travel behavior of employees at eight downtown Seattle employers operating with various forms of flexitime showed a diffusion of the peakload. The proportion commuting in the highest morning peak hour--7:30 a.m. to 8:30 a.m.--was down 33.2 percent after flexitime started; the proportion traveling in the highest afternoon peak hour of 4 p.m. to 5 p.m. dropped 19.7 percent. Employees generally chose to start work earlier than they had before flexible hours. Fifty-four percent reported to work before 7:30 a.m. compared with less than 25 percent before the flexitime program. A Commuter Pool official told us in June 1982 that the spread of employee work times has continued.

### CONCLUSIONS

Changes in work hours have benefited both employers and employees. Many of the employers and employees we contacted who have not changed their work hours expressed receptivity to making changes. The Federal Government, transit systems, and local governments should capture this receptivity and use it to encourage further spreading of work hours that would benefit all parties involved.

In Boston, New York, Philadelphia, and Seattle, successful variable work-hours programs were run during the last decade. However, these programs did not seek widespread spreading of work-hour patterns. While their objectives were more modest than what we believe is needed to maximize benefits, they did succeed in showing that changes in work schedules can be accomplished. Additional spreading of work hours has the potential for providing significant savings to the Government and other benefits to employers and employees.

More employers are adopting variable work-hours programs and have found them to be beneficial to operations. At the company we surveyed that used flexible hours, employees on their own initiative spread their work hours by more than an hour. Employees on fixed schedules indicated they would choose a wide range of starting and finishing times if permitted. Experience in some large cities has shown that people will change their work hours when encouraged.

## CHAPTER 4

### ACHIEVING WORK SCHEDULE CHANGES

#### AND TRANSIT SAVINGS REQUIRES GREATER

#### COMBINED FEDERAL AND LOCAL EFFORTS

UMTA's efforts to encourage spreading of employee work hours generally have been modest. It relies on local transit authorities and governments to decide whether to encourage the spreading of employee work hours. This practice has not fostered an understanding of the full benefits of these programs by the Federal Government and others.

We believe UMTA needs to more actively encourage and support local programs to vary employee work hours over long time periods. To be successful, these programs will require active participation by UMTA, local transit authorities, the business community, and other organizations.

#### UMTA'S EFFORTS TO ENCOURAGE WORK- HOURS CHANGES HAVE BEEN MODEST

UMTA has not funded projects to determine the savings that could be realized through greater use of variable work hours, nor has it identified which cities have a peaking problem that could be alleviated by spreading work hours over a longer time period. Moreover, UMTA has given little attention to directly promoting changes to work hours. According to UMTA officials, UMTA has addressed the problems associated with transit peaking mostly by providing funds for research and demonstration projects through the Office of Service and Management Demonstration. For example, UMTA funded a demonstration project in Duluth, Minnesota, aimed at moving riders from the peak period of the morning rush hour through use of discount fare passes sold by employers. One of the project's objectives was to move enough riders from the 1/2-hour peak to eliminate two or three trips during that period. If that could be accomplished, the local authority might save \$50,000 to \$60,000 annually. A final report is expected in the spring of 1983.

Another example of UMTA-funded research is a January 1980 report entitled "The Behavioral Impacts of Flexible Working Hours." The basis for the study was a flexitime experiment conducted at the U.S. Department of Transportation's Transportation System Center in Cambridge, Massachusetts.

Some findings of the study were:

--Flexitime brought about a slight increase in use of public transit and carpooling and a slight decrease in solo drivers.

--Thirty percent of transit users found their commute taking 11 minutes less on the average.

--Sixty-eight percent of carpoolers reported a faster commute by an average of almost 11 minutes.

UMTA's section 8 transportation improvement programs are another means for UMTA to be involved with variable work-hours programs. UMTA regulations stipulate that, to receive capital or operating assistance, each transit authority must participate with other governmental entities to develop a transportation improvement program. Selecting activities that focus on transit system improvements through service, operations, or management changes rather than through facility changes is a key factor in these programs. Promoting variable work-hours programs is one of the accepted activities for transportation improvement programs.

UMTA makes funding available for both planning and implementation of transportation improvement programs. It has not prescribed which activities should be included in a transportation improvement program, but it has highlighted certain activities that should be present. Changing work schedules is not one of the highlighted activities. An UMTA official advised us that UMTA leaves it to local officials to decide whether a variable hours program should be included as part of a transportation plan.

UMTA has not undertaken a concerted effort to encourage the use of variable work-hours programs, nor has it developed guidance for transit authorities, planning organizations, employers, and others to use in developing variable work-hours programs. Also, UMTA has not determined which urban areas have peaking problems that could be relieved by further spreading of work hours. According to UMTA's Chief, Transit Service Division, UMTA has limited its involvement for several reasons. First, UMTA believed the staggered work-hour programs in Philadelphia and New York in the early 1970's clearly established these programs as feasible, and it did not think further funding of demonstration projects was necessary. We agree. Second, other research had focused on questions such as the impact of flexitime on an individual's choice of transit modes. Consequently, UMTA did not think it needed to sponsor further study of the transportation impact of variable work hours on transit peaking. Finally, the transit industry has not shown much interest in transit peaking and spreading of work hours.

Historically, operational kinds of improvements, such as improving traffic signal timing, have been undertaken by local authorities. Little has been done with institutional types of changes, such as varying work hours. An exception to this has been ridesharing, for which part of the program has been aimed at changing work hours to increase opportunities to rideshare.

TRANSIT OFFICIALS' COMMENTS ON  
IMPLEMENTING VARIABLE WORK-HOURS PROGRAMS

SEPTA officials believed both the city government and the chamber of commerce would need to take an active role to improve business participation in a program to change work hours. They thought a work-hours program should be combined with service improvements to attract riders. Finally, they thought a program would have a greater chance of success if there were an immediate problem or perceived problem with transit that spreading of work hours would solve.

Officials from the American Public Transit Association believed selling or promoting the program and developing public awareness would be essential. They also thought that employers would be more easily persuaded to support a locally led program than one run directly by UMTA. The officials also said that the Association may be able to help promote spreading of work hours through its newsletters, conferences, and workshops.

CONCLUSIONS

UMTA's past efforts to fund research and demonstrations on the use of variable work-hours programs provide a foundation for moving into a more active role. Some UMTA funds have already been used for programs affecting work hours, but UMTA has not given sufficient attention to get local officials to encourage employers and employees to change work hours in ways that will benefit all parties.

As discussed in chapter 2, spreading work hours over long time periods provides the potential for savings in the costs of buying mass transit vehicles and some additional economies in operating costs. In addition, service reliability can be achieved on rail lines where service frequency is highly concentrated. As discussed in chapter 3, employers and employees have shown a willingness to vary work hours. Work-hour changes have been made to vary work-hour patterns that would benefit transit systems, employers, and employees.

UMTA recognizes that peaking is a widespread problem facing urban areas. It needs to determine which urban areas have transit systems that could benefit from spreading work hours over longer time periods and encourage them to establish variable work-hours programs to move riders away from current peak commuting times.

We believe that UMTA should be requiring urban areas where transit systems could benefit by spreading of work hours to provide for variable work hours in their transportation improvement plans.

Urban areas may need assistance in establishing and carrying out effective variable work-hours programs. We believe that UMTA is a logical organization to provide this type of assistance. UMTA could determine what makes an effective variable work-hours program based on the experience of successful programs. Then UMTA could share its information with others who want to establish similar programs.

At present local transit authorities have little incentive to initiate or participate in efforts to spread work hours because the cost of buying vehicles is largely borne by Federal, State, and local governments. However, the costs of operating variable work-hours programs could fall on the local transit authorities. Transit authorities would have an incentive to participate in variable work-hours programs if they were given preference in receiving discretionary Federal funds for vehicle purchases.

Because of the potential for reducing the needs for operating equipment that could result by spreading work hours over longer time periods, we believe that urban areas that attempt to achieve such spreads should be given preference for receiving UMTA funds. This policy would help ensure that the most effective use is made of limited Federal funding.

#### RECOMMENDATIONS TO THE SECRETARY OF TRANSPORTATION

We recommend that the Secretary of Transportation direct the Administrator of UMTA to:

- Determine which urban areas have a peaking problem that can be alleviated by additional spreading of employee work hours.
- Require areas that can benefit by spreading work hours to address variable work-hours programs in their transportation improvement plans.
- Establish guidance for local transit authorities, planning organizations, employers, and others to use in establishing and operating variable work-hours programs.
- Give preference in receiving discretionary funds for purchases of vehicles to urban areas that have established variable work hours programs in which the transit authority is an active participant and to those urban areas that tried to establish a program but were unable to do so. Transportation authorities that do not participate in variable work-hours programs should be required to demonstrate acceptable reasons for not participating before they receive grants to purchase vehicles.

## AGENCY COMMENTS AND OUR EVALUATION

DOT, in its September 9, 1982, letter (app. VII), commenting on our draft report, stated that it is already providing section 8 funds and encourages the consideration of flexible work scheduling, both through its joint planning regulations and its section 8 program emphasis areas.

The tone of DOT's comments indicates to us that it believes that its current efforts are sufficient. We realize that DOT has taken actions to encourage the spreading of commuter work hours. However, in view of the large amount of funds provided by UMTA for vehicle purchases and the potential savings that can be achieved, we believe that UMTA needs to give more emphasis in seeing that variable work-hours programs are undertaken.

DOT also stated that our recommendation that UMTA establish guidance for local transit authorities, planning organizations, employers and others, to assist them in establishing and operating variable work-hours programs asks it to exert greater leverage over the content of transportation plans developed by transit entities. It also believed our recommendation that discretionary grants should be targeted to urban areas with peak hour plans called for DOT to exert greater leverage of local transportation plans.

DOT believed that these actions would be inconsistent with the administration's policies of providing greater flexibility to State and local jurisdictions to plan and develop transportation programs and projects best suited to their individual needs. DOT also believed that the appropriate role for the Federal Government is to make information available to State and local governments on the potential savings to be gained through spreading their commuter work hours. It believed this information would aid urban communities without preempting their decision-making authority.

We did not state directly in our draft report that it was our intent that local transit authorities who had tried to implement variable work-hours programs but were unsuccessful should be given equal preference to those transit authorities who were participating in variable work-hours programs. To clarify our position, we have revised the recommendation on page 39 of this report.

We changed the recommendation to recognize that local transit authorities cannot act solely on their own to implement variable work hours programs because the cooperation of others, such as employers and employees, is essential for a program to be successful. Lack of cooperation by others should not, in our opinion, be used as a reason for denying funds to local transit authorities. We believe, however, that giving priority to local transit authorities who are participating in variable

work hours programs and to those that tried, would help ensure that the best use is made of the Federal grant funds available for mass transit.

We believe that our recommendations are more consistent with the administration's policies than DOT recognized. First, our recommendation that guidance be provided was intended to assist local transit authorities and others in making decisions on the types of projects that best suit their needs. This, we believe, coincides with the administration's policy of allowing local entities to make decisions.

Second, our recommendation that preferences be given when providing discretionary grants for purchases of vehicles would not interfere with the decisionmaking authority of State and local governments. It would, however, help ensure that the most effective projects are selected by providing monetary incentives to transit authorities to participate in variable work-hours programs. The transit systems that would choose not to participate would have the option of explaining why or being given lower priority in receiving grant funds for purchases of transit vehicles. The final decisions would rest at the local level.

An UMTA official has advised us that it would cost between \$100,000 and \$150,000 to implement the recommendations we are making.

## CHAPTER 5

### SCOPE AND METHODOLOGY OF THE REVIEW

Detailed work on this review was conducted at transit authority offices in Philadelphia and Pittsburgh, Pennsylvania, and at UMTA headquarters in Washington, D.C. In Philadelphia and Pittsburgh we sent questionnaires to large employers in the CBDs and to employees at three organizations. We contacted local government and transit officials in Boston, New York, Philadelphia, Seattle, and elsewhere who had been involved in programs to spread work hours. We also reviewed a number of reports and studies on the subject of variable work hours.

In planning our review, we discussed our objectives with an UMTA official who told us that two basic types of transit systems serve urban areas: (1) those that rely mostly on surface transit routes, generally using buses, operating to and from the CBD and (2) those that also have rail routes, generally subway, with connecting surface transit routes. The UMTA official suggested that we select for analysis transit routes in a city with a subway system and in a city that relies totally or principally on surface transit routes. This would enable us to determine the impact that changing work hours would have on the most common types of transit routes operated in cities where peaking is a problem. The UMTA official further stated that Philadelphia and Pittsburgh were representative of both types of transit systems.

We chose Philadelphia because it has a subway system that carries many employees to and from the CBD. Many of the subway passengers use connecting surface transit routes between their homes and the subway line. For our detailed analysis we chose the subway route that carries the largest number of passengers. It is the next route for which vehicles will need to be purchased.

We also chose for detailed analysis three of the bus routes that connect with the subway line. These routes were similar in length and peaking characteristics to a number of other transit routes operated by the Philadelphia transit system. These routes should provide an indication of the impact that changing work hours would have on subway lines and connecting surface routes in Philadelphia and other cities. The other cities that have subway systems and a network of connecting surface routes include Atlanta, Boston, Chicago, Cleveland, New York, San Francisco, and Washington.

We chose Pittsburgh because its transit system relies mainly on bus and trolley surface routes to transport persons to and from the CBD. We selected for detailed analysis one trolley route and one express bus route. Transit authority officials in Pittsburgh told us these routes were similar to a number of others operating between the Pittsburgh CBD and residential areas. Other cities that rely heavily on surface routes are



Baltimore, Cincinnati, Dallas, Detroit, Houston, Los Angeles, Miami, and Seattle. Cities with subway systems also have surface routes over which people travel to and from the CBD and their homes.

We tested the impact that spreading peak ridership over a 2-1/4-hour period each morning and afternoon would have on the equipment needs and labor costs on transit routes we selected in Philadelphia and Pittsburgh. The boundaries of the time periods were 7 a.m. and 9:15 a.m. and 3:30 p.m. and 5:45 p.m., because available information indicated that employee work hours in these cities are spread over approximately these time periods. Employees have about an 8-1/2-hour spread between the time they begin and end their work.

For each route selected, we calculated the number of vehicles that could be eliminated and the labor costs that would be reduced if transit ridership were spread evenly over each 2-1/4-hour period. In other words, total ridership during the 2-1/4-period was unchanged; only its distribution over the periods was modified. We determined how many vehicle trips would need to be made, the times the trips would need to be operated, the number of vehicles that would be needed, the times the operators would need to work, and the number of operators that would be needed. Using this information, we calculated the vehicle and labor costs that would be incurred to operate the routes under our schedules and compared this with the costs the transit authorities were incurring for the schedules they were operating.

The ridership data we used was from passenger counts conducted by the two transit authorities in September and October 1980 and October 1981--the most current data available at the time of our analysis. Transit authority scheduling personnel in Philadelphia and Pittsburgh reviewed our proposed schedules to ensure that those we developed could have been used if peak ridership had been distributed evenly over 2-1/4-hour periods.

Another reason for selecting the 2-1/4-hour time period for our study was because we believed that spreading ridership over that period would be achievable through programs to change employee working hours in CBDs. We believe that longer or shorter time periods, or other starting and stopping times, could also result in savings for transit systems and benefits for employers and employees.

We also tested the impact of spreading peak ridership evenly over a 1-3/4-hour period each morning and afternoon to obtain an indication of the impact on transit vehicle needs if commuter work hours were spread over another, but shorter, time period. The boundaries of the shorter time periods were 7:15 a.m. and 9 a.m. and 3:45 p.m. and 5:30 p.m.

We recognize that it is unrealistic to expect that an absolutely even distribution of ridership could be achieved, but we believe that an effective program of working with employers and employees could result in changes to work-hour patterns that would approach a nearly even distribution of transit ridership. If a sufficiently even spread of work hours can be achieved, the resulting ridership pattern would be such that vehicles could be scheduled at even intervals, even though the number of passengers on each vehicle may vary somewhat.

We selected an even distribution of ridership because we believed that pattern would result in the most benefits to the transit systems and should be an objective of variable work-hours programs. Past programs generally attempted to get employees to change their working hours away from the peak periods that were causing transportation problems, but we are not aware of any programs that tried to achieve an even distribution of ridership over a long time period, such as 2-1/4-hours. While we do not know the extent that ridership can be evenly distributed, we observed that employees are willing to start and end work within the 2-1/4-hour time periods we selected. We tried to find out whether encouragement and incentives could be used to change commuting times.

We made our estimates of the potential savings of vehicle costs on the basis that vehicles would be purchased at today's prices. We recognize that the savings would not be realized until a variable work-hours program was in place and until vehicles needed to be replaced. The potential savings in vehicle purchase costs we show for the Philadelphia subway line, the Pittsburgh streetcar line, and the bus routes should be viewed in the context of the type of savings that would be achieved when vehicles need to be replaced rather than immediate savings.

In both cities we developed revised transit schedules using the revised ridership pattern. To make our results as authentic as possible, we used the same procedures the transit authorities use in creating schedules. To calculate the potential for savings we used 1982 vehicle replacement costs. For labor savings we calculated the difference in labor costs for operators between the existing schedule and our revised schedule using 1982 wage rates in Philadelphia and 1981 wage rates in Pittsburgh.

To assess employer receptivity to changing work hours, we sent questionnaires to 158 large employers in the Philadelphia and Pittsburgh CBDs. In Philadelphia 61 firms completed our questionnaires; in Pittsburgh 67 firms completed questionnaires. We selected large employers because we believe a program should be directed toward the employers who would have the greatest impact on peak ridership. Another reason why we selected large employers was because we could not select employers on a statistical basis as we were unable to obtain a listing of all employers in the Philadelphia and Pittsburgh CBDs.

In Philadelphia, we sent our questionnaires to all the employers we identified that had 300 or more employees working in the CBD. In Pittsburgh we sent questionnaires to all the employers we identified that had 100 or more employees working in the CBD. We estimate that, for each city, we received responses from the organizations employing about 37 percent of the employees in the CBD.

Two versions of the questionnaires were sent to employers. One version was sent to employers that used fixed work hours and the other to firms that used some form of variable work hours. (See app. I for a list of the participating organizations and apps. III and IV for copies of the questionnaires.)

To obtain an indication of employee attitudes about changing work hours, we sent questionnaires to employees in three firms--two in Philadelphia and one in Pittsburgh. Three separate random samples were made, involving a total of 913 of these firms' over 5,000 employees. Responses were received from 748 employees.

One Philadelphia firm used fixed work hours; the other firm used staggered hours. Employees in both organizations were given questionnaires about using fixed work hours because the amount of work staggering by the one firm was very limited. The employees in Pittsburgh had a flexible work-hours program, and we asked them their views on flexible work hours and the potential for additional changes in their work hours. (See apps. II, V, and VI for information on the questionnaire response rates and copies of the questionnaires.)

ORGANIZATIONS THAT RESPONDED  
TO GAO WORK HOURS QUESTIONNAIRES

Philadelphia

Acme Markets, Inc.  
After Six, Incorporated  
American Telephone & Telegraph Co.  
ARA Services, Inc.  
Atlantic Richfield Co., Inc.  
Blank, Rome, Comisky & McCauley  
Blue Cross of Greater Philadelphia  
Catalytic, Incorporated  
Catholic Social Services of the  
    Archdioceses of Philadelphia  
Colonial Penn Insurance Company  
Community College of Philadelphia  
Consolidated Rail Corporation  
Continental Bank  
Coopers & Lybrand  
Curtis Circulation Company  
Federal Reserve Bank of Philadelphia  
Fidelity Mutual Life Insurance Co.  
First Pennsylvania Bank  
FMC Corporation  
Franklin Consulting Co., Inc.  
General Accident Fire Life Assn.  
General Services Administration  
Gimbel Brothers, Inc.  
Girard Trust Bank  
Greyhound Lines, Incorporated  
Hahnemann Medical College and Hospital  
Hay Associates  
INA Corporation  
INCO Electroenergy Corporation  
International Mill Service, Inc.  
John Wanamaker  
Keystone Shipping Company  
Laventhol and Horwath  
Metropolitan Hospital, Inc.  
Morgan, Lewis, & Bockius  
National Publishing Company  
Penn Mutual Life Insurance Co.  
Pennsylvania Hospital  
Pennsylvania Manufacturers Association Insurance  
Pennwalt Corporation  
Philadelphia Electric Company  
Philadelphia Life Insurance Co.  
Philadelphia National Bank

Philadelphia Savings Fund Society  
 Provident National Bank  
 Prudential Insurance Company  
 Realty Services Company  
 R.N. Health Services, Inc.  
 Rohm and Haas Company  
 Sheraton Corporation  
 Strawbridge and Clothier  
 The Winchell Company  
 Thomas Arthur Company  
 Thomas Jefferson Hospital  
 Trinidad Corporation  
 United Engineers & Constructors  
 United NESCO Container Company  
 United States Mint  
 U.S. Army Corps of Engineers  
 W.B. Saunders Co.  
 Wolf Block Schorr Solis-Cohen

These 61 organizations reported employing 66,453 people in the Philadelphia CBD.

#### Pittsburgh

Aetna Life and Casualty  
 Alcoa  
 Allegheny County Government  
 Allegheny International  
 American Telephone and Telegraph Co.  
 AMPCO Pittsburgh Corporation  
 Blue Cross of Western Pennsylvania  
 Chubb Insurance Group  
 City of Pittsburgh Government  
 Colonial Press  
 Consolidated Natural Gas  
 DCASMA - Defense Contract Administration Services  
 Management Area - Pittsburgh Office  
 Dollar Savings Bank  
 Dravo  
 Duquesne Light Company  
 Duquesne University  
 Eastern Associated Coal Corporation  
 Equibank  
 Equitable Gas Company  
 Equitable Life Assurance Society  
 Fireman's Fund Insurance  
 First Federal Savings and Loan Association  
 Fisher Scientific Company  
 General Refractories Company  
 Golden Triangle YMCA

Gulf Oil Corporation  
Harbison - Walker (Dresser Industries)  
Hughes and Hatcher  
John W. Galbreath and Company  
Jones and Laughlin Steel Corporation  
Joseph Horne Company  
Joy Manufacturing Company  
K,M, & G International, Inc.  
Koppers Company, Inc.  
Lane Bryant  
Liberty Mutual Insurance  
Limbach Company  
Marsh and McLennan, Inc.  
Mellon Bank  
Oliver Realty, Inc.  
Parker/Hunter  
Peoples Natural Gas  
Pittsburgh Hilton Hotel  
Pittsburgh National Bank  
Pittsburgh Press Company  
Point Park College  
PPG Industries  
Price Waterhouse and Company  
Reed, Smith, Shaw, and McCloy  
Richardson, Gordon, and Associates, Inc.  
Rockwell International  
R.T. Patterson Company, Inc.  
Saks Fifth Avenue  
Swindell Rust  
The Bell Telephone Company of Pennsylvania  
The Travelers Insurance Company  
U.S. Army Corps of Engineers - Pittsburgh District  
U.S. Department of Housing and Urban Development  
U.S. Insurance Group  
U.S. Internal Revenue Service  
Veterans Administration Regional Office  
Wean United, Inc.  
Western Union Telegraph Company  
Westinghouse Electric Corporation  
Wheelabrator - Frye, Inc.  
William Penn Hotel  
YMCA of Greater Pittsburgh

These 67 organizations reported employing 44,672 people in the Pittsburgh CBD.

QUESTIONNAIRE RESPONSE RATESEmployer Fixed Work-Hours Questionnaire

	<u>Philadelphia</u>	<u>Pittsburgh</u>	<u>Total</u>
Sent	40	49	89
Returned	30	40	70
Response rate	75%	82%	79%

Employer Variable Work-Hours Questionnaire

	<u>Philadelphia</u>	<u>Pittsburgh</u>	<u>Total</u>
Sent	41	28	69
Returned	31	27	58
Response rate	76%	96%	84%

Employee Fixed Work-Hours Questionnaire

	<u>Company A</u>	<u>Company B</u>	<u>Total</u>
Sent	263	330	593
Returned	218	250	468
Response rate	83%	76%	79%

Employee Flexible Work-Hours Questionnaire

Sent	320
Returned	280
Response rate	88%



U. S. General Accounting Office  
 Survey of Organizations Using  
 Fixed Work Hours Schedules

To:

1. Which of the following categories best describes the nature of your organization's activity in the CBD? (Check one.) (6)

- 1.  Retail/wholesale trade
- 2.  Service (hotels, recreation, health, education, etc.)
- 3.  Finance (insurance, banking, credit, real estate, etc.)
- 4.  Transportation, communication, utilities
- 5.  Manufacturing
- 6.  Government (Federal, State, local, quasi-Governmental)
- 7.  Other: (please specify) \_\_\_\_\_

Introduction

The U.S. General Accounting Office, an agency of the Congress, is studying the impact of central business district (CBD) working hours on mass transit systems. As part of this effort, we are surveying a sample of organizations in the CBDs of Philadelphia and Pittsburgh, Pennsylvania to learn about work hours practices and opinions of variable (staggered, compressed, or flexible) work hours.

For the purposes of this survey, the following terms are defined:

1. Central Business District (CBD) - that area of downtown Pittsburgh with high land values, concentrated employment, and heavy retail trade. The geographical boundaries are a triangle formed by the Allegheny and Monongahela Rivers on two sides and by 11th Street, Grant Street, 7th Avenue, Bigelow Boulevard, and Crosstown Boulevard on the third.

2. Variable Work Hours

- a. Staggered - a work hours schedule where the organization sets the work hours, but varies the hours among groups of employees or departments within the organization.
- b. Compressed - a work hours schedule where the organization sets the work hours, but employees can shorten a normal work week into fewer than 5 full workdays by working longer days.
- c. Flexible - a work hours schedule that provides individual workers some option over when their workday begins and ends without changing the total hours of work in a given period.

We recognize that your organization may have more than one location in the CBD and that work schedules may vary by location. If you have multiple locations, please answer the questions with reference to the work hours at your three largest locations.

If you have any questions, please call Mr. Dan Weeber at (412) 644-5903. Thank you for your help.

2. What are the approximate percentages of the following types of employees at your CBD locations? (Enter a percentage for each row.)

	<u>Percent</u>
1. Managerial, technical, professional	_____ (7-9)
2. Sales	_____ (10-12)
3. Clerical	_____ (13-15)
4. Service	_____ (16-18)
5. Other (Please specify) _____	_____ (19-21)
Total	100%

3. Has your organization ever had a variable work hours program?

- 1.  Yes (22)
- 2.  No (skip to question #5)

4. Please briefly explain (a) the program and (b) why it was discontinued.

(a) \_\_\_\_\_ (23)

(b) \_\_\_\_\_ (24)



5. How many fulltime regular employees, by location, are working for your organization in the CBD and what are the typical daily starting and finishing times for employees? (Complete table below.)

<u>Number of employees</u>	<u>Address</u>	<u>Starting times</u>	<u>Finishing times</u>
_____ (25-29)	_____	: a.m. (30-32)	: p.m. (33-35)
_____ (36-40)	_____	: a.m. (41-43)	: p.m. (44-46)
_____ (47-51)	_____	: a.m. (52-54)	: p.m. (55-57)

6. What is the likelihood that, within the next 3 years, you will adopt a variable (staggered, compressed, or flexible) work hours program? (Check one.) (58)

1.  Very likely      3.  Uncertain      5.  Very unlikely  
 2.  Somewhat likely      4.  Somewhat unlikely      6.  No basis to judge

7. Regardless of whether or not your organization is likely to adopt a variable work hours program, how favorable or unfavorable would you assume the impact to be on the following factors? (Check one box for each row.)

<u>Employee Factors:</u>	<u>Very Unfavorable</u>						
	1	2	3	4	5	6	
1. Recruiting employees							(59)
2. Retaining employees							(60)
3. Maintaining employee productivity							(61)
4. Maintaining employee morale							(62)
5. Maintaining employee/management relations							(63)
6. Ensuring employees report on time							(64)
7. Ensuring daily work attendance							(65)
8. Facilitating employee commuting							(66)
9. Other (Please specify)							(67)
<u>Organizational Functions or Services:</u>							
1. Servicing customers							(68)
2. Maintaining inter-/intra- office communication							(69)
3. Affecting overtime costs							(70)
4. Utilizing equipment effectively							(71)
5. Utilizing utilities efficiently							(72)
6. Providing adequate supervisory coverage							(73)
7. Maintaining payroll/timekeeping records							(74)
8. Maintaining organizational efficiency/profitability							(75)
9. Other (Please specify)							(76)

8. For the locations listed in Question 5, we are interested in knowing how easy or difficult it would be to shift your organization's CBD employees starting times by the following amounts? (Check one box for each row.)

(Address of largest location)

	Very Difficult 1	Somewhat Difficult 2	No Impact 3	Somewhat Easy 4	Very Easy 5	
1. 15 min. earlier						(77)
2. 15 min. later						(78)
3. 30 min. earlier						(79)
4. 30 min. later						(80)
5. 45 min. earlier						(81)
6. 45 min. later						(82)
7. 60 min. earlier						(83)
8. 60 min. later						(84)

(Address of second largest location)

	Very Difficult 1	Somewhat Difficult 2	No Impact 3	Somewhat Easy 4	Very Easy 5	
1. 15 min. earlier						(85)
2. 15 min. later						(86)
3. 30 min. earlier						(87)
4. 30 min. later						(88)
5. 45 min. earlier						(89)
6. 45 min. later						(90)
7. 60 min. earlier						(91)
8. 60 min. later						(92)

(Address of third largest location)

	Very Difficult 1	Somewhat Difficult 2	No Impact 3	Somewhat Easy 4	Very Easy 5	
1. 15 min. earlier						(93)
2. 15 min. later						(94)
3. 30 min. earlier						(95)
4. 30 min. later						(96)
5. 45 min. earlier						(97)
6. 45 min. later						(98)
7. 60 min. earlier						(99)
8. 60 min. later						(100)

9. To what extent, if at all, would any of the following attract your organization to adopt a variable work hours program? (Check one box for each row.)

	To a Very Great Extent 1	To a Great Extent 2	To a Moderate Extent 3	To Some Extent 4	To Little or No Extent 5	No Basis to Judge 6	
1. Technical assistance from the transit authority and/or regional planning organization in starting a variable work hours program.							(101)
2. Reduced fares for employees who, through a variable work hours program, can commute during periods other than the peak part of the rush hour.							(102)
3. Employees desire to have a variable work hours program.							(103)
4. Adoption of variable work hours by other organizations in your line of business.							(104)
5. Adoption of variable work hours by other organizations in your area.							(105)
6. Demonstration of variable work hour program benefits realized by other organizations.							(106)
7. Evidence that a variable work hours program could potentially increase transit authority operational efficiency.							(107)
8. Other (Please explain briefly) _____ _____							(107)

10. Please provide any additional comments you may have on variable work hours programs. (108)

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U. S. General Accounting Office  
 Survey of Organizations Using  
 Variable Work Hours Schedules

To:

**Introduction**

The U.S. General Accounting Office, an agency of the Congress, is studying the impact of central business district (CBD) working hours on mass transit systems. As part of this effort, we are surveying a sample of organizations in the CBDs of Philadelphia and Pittsburgh, Pennsylvania to learn about work hours practices and opinions of variable (staggered, compressed, or flexible) work hours.

For the purposes of this survey, the following terms are defined:

1. Central Business District (CBD) - that area of downtown Pittsburgh with high land values, concentrated employment, and heavy retail trade. The geographical boundaries are a triangle formed by the Allegheny and Monongahela Rivers on two sides and by 11th Street, Grant Street, 7th Avenue, Bigelow Boulevard, and Crosstown Boulevard on the third.

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- c. Flexible - a work hours schedule that provides individual workers some option over when their workday begins and ends without changing the total hours of work in a given period.

We recognize that your organization may have more than one location in the CBD and that work schedules may vary by location. If you have multiple locations, please answer the questions with reference to the work hours at your three largest locations.

If you have any questions, please call Mr. Dan Weeber at (412) 644-5903. Thank you for your help.

1. Which of the following categories best describes the nature of your organization's activity in the CBD? (Check one.) (6)

1.  Retail/wholesale trade
2.  Service (hotels, recreation, health, education, etc.)
3.  Finance (insurance, banking, credit, real estate, etc.)
4.  Transportation, communication, utilities
5.  Manufacturing
6.  Government (Federal, State, local, quasi-Governmental)
7.  Other: (please specify) \_\_\_\_\_

2. What are the approximate percentages of the following types of employees at your CBD locations? (Enter a percentage for each row.)

	Percent
1. Managerial, technical, professional	____(7-9)
2. Sales	____(10-12)
3. Clerical	____(13-15)
4. Service	____(16-18)
5. Other (Please specify) _____	____(19-21)
Total	100%

3. When did your organization adopt variable work hours? (Check one.) (22)

- |  |  |
|--|--|
| 1. <input type="checkbox"/> 1980 or 1981 | 3. <input type="checkbox"/> 1971 to 1975   |
| 2. <input type="checkbox"/> 1976 to 1979 | 4. <input type="checkbox"/> 1970 or before |

4. Why did your organization start using variable hours? (Please explain briefly.) (23)

\_\_\_\_\_  
 \_\_\_\_\_

5. How many fulltime regular employees, by location, are working for your organization in the CBD and what is the type of variable work hours program at each location? (Complete table below.)

Number of employees	Address	Type of variable work hours program				
		1 staggered	2 compressed	3 flexible	4 combination	
(24-28)	(29)					(30)
(31-35)	(36)					(37)
(36-42)	(43)					(44)

6. How unfavorable or favorable an effect on your organization has the use of variable work hours had on the following? (Check one box for each row.)

Employee Factors: Organizational Functions or Services:	1 Very Unfavorable 2 Somewhat Unfavorable 3 Little or none 4 Somewhat favorable 5 Very favorable 6 Don't know or not considered					
	1	2	3	4	5	6
1. Recruiting employees						(45)
2. Retaining employees						(46)
3. Maintaining employee productivity						(47)
4. Maintaining employee morale						(48)
5. Maintaining employee/management relations						(49)
6. Ensuring employees report on time						(50)
7. Ensuring daily work attendance						(51)
8. Facilitating employee commuting						(52)
9. Other (Please specify)						(53)
1. Servicing customers						(54)
2. Maintaining inter-/intra-office communication						(55)
3. Affecting overtime costs						(56)
4. Utilizing equipment effectively						(57)
5. Utilizing utilities efficiently						(58)
6. Providing adequate supervisory coverage						(59)
7. Maintaining payroll/timekeeping records						(60)
8. Maintaining organizational efficiency/profitability						(61)
9. Other (Please specify)						(62)

7. Does your organization plan to make changes to the work schedule? (63)

1.  Yes      2.  No (Please go to #9.)

3. Briefly, please describe (a) the changes planned and (b) the reasons for them.

(a) \_\_\_\_\_ (64)

(b) \_\_\_\_\_ (65)

9. Currently, for the locations listed in question #5, what is the approximate percentage of employees arriving for work each day at the times listed below? (Enter number and percentages below where appropriate.) (66)

	Mon.	Tue.	Wed.	Thu.	Fri.
Percentage of employees arriving closest to:					
6:00 a.m.					
6:30 a.m.					
6:45 a.m.					
7:00 a.m.					
7:15 a.m.					
7:30 a.m.					
7:45 a.m.					
8:00 a.m.					
8:15 a.m.					
8:30 a.m.					
8:45 a.m.					
9:00 a.m.					
9:15 a.m.					
9:30 a.m.					
10:00 a.m.					
All other times					
Percent total	100%	100%	100%	100%	100%

10. Considering both organization and employee needs, please estimate the percentage of employees currently starting during the period 8:00 a.m. to 9:00 a.m. who could change starting times to 7:45 a.m. or earlier or 9:15 a.m. or later. (Enter percentage below.)

1. \_\_\_\_\_% could change to 7:45 a.m. or earlier (67-69)  
 2. \_\_\_\_\_% could change to 9:15 a.m. or later (70-72)

11. Currently, for the locations listed in question #5, what is the approximate percentage of employees leaving work each day at the times listed below? (Enter percentages below.) (73)

	Mon.	Tue.	Wed.	Thu.	Fri.
Percentage of employees leaving closest to:					
2:30 p.m.					
3:00 p.m.					
3:15 p.m.					
3:30 p.m.					
3:45 p.m.					
3:45 p.m.					
4:00 p.m.					
4:15 p.m.					
4:30 p.m.					
4:45 p.m.					
5:00 p.m.					
5:15 p.m.					
5:30 p.m.					
5:45 p.m.					
6:00 p.m.					
6:30 p.m.					
All other times					
Percent total	100%	100%	100%	100%	100%

12. Please provide any additional comments you may have on variable work hour programs and commuting practices. (74)

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_



U.S. GENERAL ACCOUNTING OFFICE  
 SURVEY OF EMPLOYEES WORKING FOR ORGANIZATIONS  
 WITH FIXED WORK HOURS SCHEDULES

INTRODUCTION

The U.S. General Accounting Office, an agency of the Congress, is studying the impact of central business district (CBD) working hours on mass transit systems. As part of the effort, we are surveying a sample of employees at a few Center City organizations to learn about their commuting and work hour preferences.

The number appearing at the top of this questionnaire is for recordkeeping purposes and not to identify individuals with their responses.

Throughout the questionnaire there are numbers printed within parentheses to assist our keypunchers in coding responses for computer analysis. Please disregard the numbers.

Please return the questionnaire in the pre-addressed, postage-paid envelope within five days, if possible. In the event the envelope is misplaced, the return address is:

Mr. Cliff Martin  
 Philadelphia Regional Office  
 U.S. General Accounting Office  
 434 Walnut Street, 11th floor  
 Philadelphia, PA 19106

If you have any questions about the survey, please call Mr. Martin at 597-4330.

Thank you for your help.

1. Which of the following occupations best describes your position? (Check one.) (6)

- 1.  Managerial, technical, professional
- 2.  Sales
- 3.  Service
- 4.  Clerical
- 5.  Other (Please specify.) \_\_\_\_\_

2. Which one of the following means do you primarily use to reach your work place in Center City? (Check one.) (Check "walk" if that is your only means of transportation.)

- 1.  Market-Frankford or Broad Street Lines
  - 2.  Commuter train
  - 3.  Bus or trolley
  - 4.  PATCO High Speedline
  - 5.  Drive alone
  - 6.  Drive with others, carpool or vanpool
  - 7.  Walk
  - 8.  Other means (Please specify.) \_\_\_\_\_
- } (Please go to question #3)  
 } (Please go to question #4)  
 } (Please go to question #9)

3. Consider only the Center City portion of your trip on public transit to and from work. Which of the following statements best describes how crowded or uncrowded conditions are on this portion of your trip? (Check one block in column A and one block in column B.)

	A To work (8)	B From work (9)
1. No elbow room		
2. Partially filled with standees		
3. No or a few standees		
4. Several empty seats		
5. Practically empty		

(Please go to question #5)

4. Which of the following traffic conditions do you usually encounter within 1 to 2 miles of Center City when traveling to and from work? (Check one block in column A and one block in column B.)

	A To work (10)	B From work (11)
1. Bumper to bumper, and crawling		
2. Heavy, but moving slowly		
3. Steady traffic but able to move at speed limit		
4. Light traffic; little effect on travel time		
5. Very little traffic		

5. Assuming your employer gave you the flexibility, would you change your starting time for work to the following? (Check one block in each row.)

STARTING TIMES	Definitely yes Probably yes Undecided Probably no Definitely no					
	1	2	3	4	5	
6:00 AM						(12)
6:30 AM						(13)
6:45 AM						(14)
7:00 AM						(15)
7:15 AM						(16)
7:30 AM						(17)
7:45 AM						(18)
	*	*	*			
8:45 AM						(19)
9:00 AM						(20)
9:15 AM						(21)
9:30 AM						(22)
10:00 AM						(23)

6. Assuming your employer gave you the flexibility, would you change your finishing time for work to the following? (Check one block in each row.)

FINISHING TIMES	Definitely yes Probably yes Undecided Probably no Definitely no					
	1	2	3	4	5	
2:30 PM						(24)
3:00 PM						(25)
3:15 PM						(26)
3:30 PM						(27)
3:45 PM						(28)
4:00 PM						(29)
4:15 PM						(30)
	*	*	*			
5:15 PM						(31)
5:30 PM						(32)
5:45 PM						(33)
6:00 PM						(34)
6:30 PM						(35)



7. Assuming your employer gave you the flexibility, to what extent, if at all, would the following factors influence you to change your working hours? (Check one block in each row.)

	To little or no extent						
	To some extent		To a moderate extent		To a great extent		
	1	2	3	4	5	6	
1. Public transit less crowded							(36)
2. Traffic conditions less crowded							(37)
3. Reduced commuting time							(38)
4. Opportunity to attend school or pursue professional interests							(39)
5. Ability to match work hours with personal or family situations							(40)
6. Ability to earn an afternoon or a day off per week or 2 weeks							(41)
7. Ability to match work hours with workload							(42)
8. Other (Please specify.)							(43)
_____							
_____							
_____							

8. Whether or not you ride public transit, we are interested in your opinion on the effect lower off-peak fares may have on starting times. To our knowledge, such fare reductions are not currently under consideration, but we want your reactions to the idea.

In the morning, Philadelphia transit systems experience their heaviest use in bringing people to Center City between 7:30 a.m. and 9:00 a.m.. Assuming your employer gave you the flexibility, would you change your work starting time to earlier than 7:30 a.m. or later than 9:00 a.m. if transit fares were reduced by the following percentages? (Check one block in each row.)

	Definitely yes					
	Probably yes		Undecided		Probably no	Definitely no
	1	2	3	4	5	
1. 10% lower						(44)
2. 20% lower						(45)
3. 30% lower						(46)
4. 40% lower						(47)
5. 50% lower						(48)
6. 100% lower (free)						(49)

9. Please use the space provided below for any comments you may have on commuting and variable work hours. (50)

THANK YOU FOR YOUR HELP.



U.S. GENERAL ACCOUNTING OFFICE  
 SURVEY OF EMPLOYEES WORKING FOR ORGANIZATIONS  
 WITH FLEXIBLE WORK HOURS SCHEDULES

INTRODUCTION

The U.S. General Accounting Office, an agency of the Congress, is studying the impact of central business district working hours on mass transit systems. As part of the effort, we are surveying a sample of employees at a few downtown companies to learn about their commuting and work hour preferences.

The number appearing at the top of this questionnaire is for recordkeeping purposes and not to identify individuals with their responses.

Throughout the questionnaire there are numbers printed within parentheses to assist our key-punchers in coding responses for computer analysis. Please disregard these numbers.

Please return the questionnaire in the enclosed pre-addressed, postage-paid envelope within five days, if possible. In the event the envelope is misplaced, the return address is:

Mr. Daniel Weeber  
 U.S. General Accounting Office  
 Suite 310  
 445 Fort Pitt Blvd.  
 Pittsburgh, PA. 15219

If you have any questions about the survey, please call Mr. Weeber at 644-5903.

Thank you for your help.

1. Which of the following occupations best describes your position? (Check one.) (6)
1.  Managerial, technical, professional
  2.  Sales
  3.  Service
  4.  Clerical
  5.  Other (Please specify) \_\_\_\_\_

2. For the last full week you worked, please provide your approximate arrival time to and departure time from downtown in the schedule below (please disregard the numbers in parentheses):

	Arrival			Departure		
	Hour	Minute	AM/PM	Hour	Minute	AM/PM
	(7-8	9-10	11)	(12-13	14-15	16)
Monday	(17-18	19-20	21)	(22-23	24-25	26)
Tuesday	(27-28	29-30	31)	(32-33	34-35	36)
Wednesday	(37-38	39-40	41)	(42-43	44-45	46)
Thursday	(47-48	49-50	51)	(52-53	54-55	56)
Friday						

3. Were you employed by Alcoa before 1978, when the current flexible work hours program was established? (Check one.) (57)

1.  Yes
2.  No (Please go to Question #5)

4. How do your starting times in Question #2 differ from 1978, before your employer had a flexible work hours program? (Check one.) (58)

- I now start about...
1.  the same time as before
  2.  15 minutes earlier
  3.  30 minutes earlier
  4.  45 or more minutes earlier
  5.  15 minutes earlier
  6.  30 minutes earlier
  7.  45 or more minutes earlier

5. How favorable or unfavorable an impact have flexible work hours had on each of the following? (Check one box for each row.)

		Very favorable	Somewhat favorable	No impact	Somewhat unfavorable	Very unfavorable	Not applicable	
		1	2	3	4	5	6	
1. Degree of crowding you experience on public transit								(59)
2. Degree of traffic congestion you experience								(60)
3. Amount of time you spend commuting								(61)
4. Your job performance								(62)
5. Your morale								(63)
6. Your opportunity for schooling or pursuing professional interests								(64)
7. Your opportunity to match work hours with personal or family situations								(65)
8. Other (Please specify) _____ _____ _____								(66)

6. Which one of the following means do you primarily use to reach your work place downtown? (Check one. Check "walk" if that is your only means of transportation.) (63)

- 1.  PAT bus or trolley (Entire ride within Zone 1 or .75 fare.)
  - 2.  PAT bus or trolley (Ride in Zone 2 or more; fare .90 or more.)
  - 3.  Commuter train
  - 4.  Drive alone
  - 5.  Drive with others, carpool, or vanpool
  - 6.  Walk
  - 7.  Other means (Please specify) \_\_\_\_\_
- (Please go to Question #7)
- (Please go to Question #8)
- (Please go to Question #9)

7. Consider only the downtown portion of your trip on public transit to and from work. Which of the following statements best describes how crowded or uncrowded conditions are on this portion of your trip? (Check one box in Column A and one box in Column B.)

	A To work (69)	B From work (70)
1. No elbow room		
2. Partially filled with people standing		
3. No or a few people standing		
4. Several empty seats		
5. Practically empty		

(Please go to Question #9.)

8. Which of the following traffic conditions do you usually encounter within 1 to 2 miles of downtown when traveling to and from work? (Check one box in column A and one box in column B.)

	A To work (71)	B From work (72)
1. Bumper to bumper, and crawling		
2. Heavy, but moving slowly		
3. Steady traffic, but able to move at speed limit		
4. Light traffic; little effect on travel time		
5. Very little traffic		

9. Do you usually report to work between 7:30 a.m. and 9:00 a.m.? (Check one.) (73)

- 1.  Yes
- 2.  No (Please go to Question #16)

10. Whether or not you currently use public transit to get to work, we are interested in how likely you might be to change your work starting time and use Pittsburgh transit if off-peak fares were lower.

Would you be willing to ride Pittsburgh transit to work before 7:30 a.m. if, by doing so, you could ride at no cost? (Check one.) (74)

- 1.  Definitely yes
  - 2.  Probably yes
  - 3.  Uncertain
  - 4.  Probably no
  - 5.  Definitely no
- } (Please go to Question #16)

11. Would you be willing to ride Pittsburgh transit to work before 7:30 a.m. if, by doing so, you could ride at a 50% lower fare? (Check one.) (75)

- 1.  Definitely yes
  - 2.  Probably yes
  - 3.  Uncertain
  - 4.  Probably no
  - 5.  Definitely no
- } (Please go to Question #16)

12. Would you be willing to ride Pittsburgh transit to work before 7:30 a.m. if, by doing so, you could ride at a 40% lower fare? (Check one.) (76)

- 1.  Definitely yes
  - 2.  Probably yes
  - 3.  Uncertain
  - 4.  Probably no
  - 5.  Definitely no
- } (Please go to Question #16)

13. Would you be willing to ride Pittsburgh transit to work before 7:30 a.m. if, by doing so, you could ride at a 30% lower fare? (Check one.) (77)

- 1.  Definitely yes
  - 2.  Probably yes
  - 3.  Uncertain
  - 4.  Probably no
  - 5.  Definitely no
- } (Please go to Question #16)

14. Would you be willing to ride Pittsburgh transit to work before 7:30 a.m. if, by doing so, you could ride at a 20% lower fare? (Check one.) (78)

- 1.  Definitely yes
  - 2.  Probably yes
  - 3.  Uncertain
  - 4.  Probably no
  - 5.  Definitely no
- } (Please go to Question #16)

15. Would you be willing to ride Pittsburgh transit to work before 7:30 a.m. if, by doing so, you could ride at a 10% lower fare? (Check one.) (79)

- 1.  Definitely yes
- 2.  Probably yes
- 3.  Uncertain
- 4.  Probably no
- 5.  Definitely no

16. Please use the space below or the back of this sheet for any comments you may have on commuting and flexible work hours. (80)



U.S. Department of  
Transportation

Assistant Secretary  
for Administration

400 Seventh St., S.W.  
Washington, D.C. 20590

SEP 9 1982

Mr. Henry Eschwege  
Director, Community and Economic  
Development Office  
U.S. General Accounting Office  
Washington, D.C. 20548

Dear Mr. Eschwege:

This is our reply to the General Accounting Office (GAO) draft report, "Spreading Commuter Work Hours Could Reduce Transit Costs," dated July 30, 1982.

The draft report made a number of recommendations to the Secretary of Transportation and the Administrator of the Urban Mass Transportation Administration (UMTA) to undertake efforts to identify urban areas in which a peaking of demands on their transit systems could be alleviated by the spreading of work hours. The draft report also suggests that UMTA approve discretionary grants to urban areas on the basis of the urban areas' active planning for spreading of work hours to remove the pressure on transit systems.

While the Department would agree there are benefits to be gained by peak spreading, we suspect that GAO may be over-optimistic in its estimates, given its review of only the Philadelphia urban area. However, we believe that transit entities should investigate the alleviation of peak hour congestion and equipment requirements through flexible scheduling. UMTA is already providing Section 8 funds and encourages the consideration of flexible work scheduling, both through its joint planning regulations and its Section 8 program emphasis areas.

Also, GAO recommends that the UMTA establish guidance for local transit authorities, planning organizations, employers and others to assist them in establishing and operating variable work hours programs. In both this recommendation and the one noted above on targeting discretionary grants to urban areas with peak hour plans, GAO is asking that UMTA exert greater leverage over the content of transportation plans developed by transit entities. The Department believes that this action would be inconsistent with the Administration's policies of providing greater flexibility to State and local jurisdictions to plan and develop transportation programs and projects best suited to their individual needs. It would seem that the appropriate role for the Federal Government is to make information available to State

and local governments on the potential savings to be gained through spreading their commuter work hours. The Department believes that this information would aid urban communities without preempting their decisionmaking authority.

If we can further assist you, please let us know.

Sincerely,

  
Robert L. Fairman



PORT AUTHORITY OF ALLEGHENY COUNTY  
Beaver and Island Avenues  
Pittsburgh, Pennsylvania 15233  
(412) 237-7000

August 17, 1982

Mr. Henry Eschwege, Director  
Community and Economic Division  
United States General Accounting Office  
Washington, D.C. 20548

Dear Mr. Eschwege:

Mr. Maloney has asked me to respond to your request for comments on your draft report, "Spreading Commuter Work Hours Could Reduce Transit Costs."

As Don Leppla of your staff may have mentioned, your report is on a subject of significant interest to us. Last year, the Port Authority put on a campaign to encourage downtown businesses to adopt flexible work hour programs. While the results of the campaign have been marginal thus far, nevertheless, our hypothesis was similar to your's — flexible work hours have the potential of reducing transit costs.

I have reviewed your draft report along with a staff person in our Operations Division which supplied the detailed route information used as examples in the report. We found no problems with the detailed information and methods GAO used to test various assumptions. However, I do feel your basic assumption that arrivals and departures can be uniformly distributed over a 2-1/4 hour period results in overly optimistic savings in capital and operating costs. With minor language changes to page 2-20, which I supplied by phone to Don Leppla, my concerns will have been correctly noted in your report.

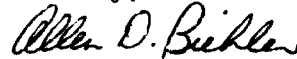
[GAO COMMENT: The discussion referred to on page 2-20 of the draft report is on page 18 of this report. Minor language changes were made.]

A second comment pertains to the first two paragraphs on page 2-21. The statement attributed to me was that costs of implementing a variable work hour program would increase PAT's operating budget while the savings in capital costs would benefit the federal government. This is inaccurate and missed the point of my comment. At the time this item was discussed I was further explaining my primary concern of over estimating cost savings. Since you've noted my primary concern on page 2-20, the first two paragraphs on page 2-21 should be deleted.

[GAO COMMENT: The discussion referred to on pages 2-20 and 2-21 of the draft report is on page 18 of this report. The discussion in the draft report concerning the cost of operating a variable work-hours program and its impact on PAT's operating budget has been deleted as suggested by PAT.]

Thank you for the opportunity to review your draft report. I hope my comments are helpful.

Sincerely,



Allen D. Biehler  
Director

Planning, Development &  
Public Services Division

CC: Donald Leppa





Southeastern Pennsylvania  
Transportation Authority

September 17, 1982

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Mr. Henry Eschwege, Director  
United States General Accounting  
Office  
Community and Economic Development  
Division  
Washington, D.C. 20548

Dear Mr. Eschwege:

This is in reply to your letter dated July 30, 1982, forwarding a partial draft report entitled "Spreading Commuter Work Hours Could Reduce Transit Costs," and subsequent conversations between John Tucker of the SEPTA staff and Donald Leppla of your department.

We would offer the following comments on the partial draft material:

1. SEPTA does not control the work or traveling times of our passengers. The observations that you make about the phenomenon of peak ridership represents a problem that has affected the economics of public transportation for more than 100 years. We believe you should make it clear in your report that the changes you are recommending are not within the management control of the transit operators.
2. Based on the draft material presented, SEPTA cannot verify the accuracy of the GAO schedule computations. While SEPTA did provide advice and assistance to your personnel, we had no control over your computations or methods. The schedules that you have prepared have not been subjected to the proofs that are normally employed to verify our own work.

We would especially note the need for your proposed work assignments to conform with all of

Mr. Henry Eschwege  
September 17, 1982  
Page 2

the provisions of applicable labor agreements.

3. We did attempt to verify the base data presented in your report regarding existing conditions. This generally appears to be correct, although we suspect that the suburban division street car requirements have been omitted from the Table on Page 2-16.

4. We believe there is an arithmetic error in the computations regarding Route 59 in the Table on Page 2-6. The result of this error is a slight overstatement of the potential economies.

5. If your plan for spreading the peak period were to be adopted, we would recommend operating a higher level of service during the extended peak. We believe it would be wise to increase the quality of service (level of comfort) as an inducement to shift hours.

6. We wish to make special note of the fact that the peak vehicle requirements at many SEPTA garages (although not those in your study) are dictated by the traffic generated by school children. At several SEPTA locations, more vehicles are needed in the early afternoon at school dismissal time than at any other time during the day. We have repeatedly tried to get the School District to spread opening and closing times to reduce this problem; they have been totally unresponsive and are vigorously opposed to the suggestion. The spreading of general travel hours would not achieve any real operating economies unless the school problem is solved.

7. As a final item, we would note that in a broad sense the peaking problem has been made worse over the past two decades by another federal program: the large scale construction of highways funded by 90% federal capital money. This program has resulted in the complete change in development and land use patterns. Many former midday transit riders have only left the transit systems because they have been lured to suburban lifestyles through the availability of fast highways.

Mr. Henry Eschwege  
September 17, 1982  
Page 3

John Tucker has discussed many of the above comments with Mr. Leppla, and I hope that you will use this information in preparing your final report.

Sincerely,



David L. Gunn  
Chief Operations Officer  
General Manager

cc: Donald Leppla

(345559)





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