

Employee Transportation Survey for Center City Philadelphia

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ABSTRACT

The development and findings of a questionnaire survey that sampled the 236,000 employees of Center City Philadelphia are described. The survey was conducted in February 1985 by the Delaware Valley Regional Planning Commission in cooperation with the city of Philadelphia and public transit authorities. The purpose of the study was to determine how employees travel to and from work, their means of transportation, and the time and cost required for the work trip. In addition, the survey was intended to provide information on perceptions of the public transportation system in general and its operation in particular. For analytical and planning purposes, the questionnaire was also designed to obtain statistics on workers' place of residence, previous employment location, and many other socioeconomic characteristics. The response to the survey was excellent. About 10,000 questionnaires were distributed at random and more than 4,000 were received and processed by computer. The results will be used to develop plans, programs, and policies for improving highway and transit facilities and attracting people to use the public transportation system.

The results of a survey designed to elicit the travel habits of some 236,000 workers employed in Center City Philadelphia (central business district) are briefly described. The questionnaire asked about their means of travel, time and cost involved in their journey to work, and their perceptions of the quality of the public transportation system. Information about age, sex, family income, and vehicle ownership was also asked in order to examine any differences in travel habits attributable to socioeconomic characteristics of the employees.

The basic objective of this survey was to collect information that could be used to develop plans, programs, and policies to improve transportation services in general and public transportation, including commuter rail service, in particular. The results of this survey will be important to decision makers and providers of public transportation who seek to improve services and facilities, enhance economic development, and attract new jobs to Center City. Specifically, the survey findings will enable these agencies to develop and implement marketing programs to increase the use, which is declining, of public transportation, especially commuter rail facilities. In addition, the survey results will be used in the preparation of programs to encourage the use of transit passes, provide adequate parking, implement a reasonable transit fare structure, and make the journey to work much more convenient and comfortable.

The survey was designed and conducted by the Delaware Valley Regional Planning Commission (DVRPC) in cooperation with the city of Philadelphia, the Southeastern Pennsylvania Transit Authority (SEPTA), the Philadelphia Chamber of Commerce, and many large and small Center City employers. The local press gave special coverage to this survey and the Philadelphia Inquirer (February 22, 1985) published an article urging employees to fill out the questionnaire. Em-

ployers were requested to coordinate the dissemination and collection of the survey forms and to return them to DVRPC for processing.

The survey methodology, including the design and distribution of questionnaires, is also discussed. Some comparison of the survey results with 1980 census data is made where information is available.

DESIGN OF SURVEY QUESTIONNAIRE

The survey questionnaire was designed after careful consideration of the data needs of the planning and operating agencies involved. For example, the city of Philadelphia wanted to obtain recent transportation information on Center City employees, such as their commuting pattern, place of residence, mode of travel, and other traffic characteristics, for use in the development of a new master plan for Center City. The city was also interested in obtaining information on the use of commuter railroad stations before and after the opening of the Center City commuter tunnel, a \$350 million facility that has connected the Pennsylvania and Reading railroad systems. The transit authorities were especially interested in knowing employees' reasons for not riding public transportation to work, in order to develop marketing programs that will attract automobile users to the transit system. They were also interested in factors that would encourage the use of transit passes, which generally make transit service faster and reduce the cost of fare collection. Finally, DVRPC was interested in gathering data on all aspects of employment and traffic characteristics that are needed for testing and recalibrating traffic simulation models and for updating long-range plans and transportation improvement programs.

The questionnaire (Figure 1), in 30 questions, integrates four essential areas of study: (a) trip characteristics, (b) usage of highway and transit modes, (c) socioeconomic characteristics, and (d) place of residence and work. The following paragraphs describe briefly the contents and purposes of the questionnaire.

Center City Employee Transportation Survey

A MESSAGE FROM
THE MAYOR OF THE CITY OF PHILADELPHIA

Dear Center City Employee:

About 300,000 people commute to work in Philadelphia Center City every weekday from other Philadelphia areas and the surrounding suburban counties. To plan for an effective and convenient highway and transit system, we need information on how you and others travel to and from Philadelphia Center City.

The Delaware Valley Regional Planning Commission, in cooperation with the City, Philadelphia Chamber of Commerce, and SEPTA, is conducting this survey as part of its transportation planning program. Your answers to the survey questionnaire will be used to develop plans, programs, and policies for improving the regional transportation system which serves Center City commuters. My administration is committed to providing you with convenient transportation service and to improving transportation facilities which will enhance economic development and attract new jobs to Center City.

Thank you for your cooperation.

W. Wilson Goode
W. Wilson Goode
Mayor

COMPLETE THIS QUESTIONNAIRE IF YOUR PRESENT PLACE OF EMPLOYMENT IS WITHIN CENTER CITY PHILADELPHIA — BOUNDED BY VINE ST., SOUTH ST., AND THE SCHUYLKILL AND DELAWARE RIVERS. ANSWER THE QUESTIONS WITH RESPECT TO YOUR TRAVEL TO AND FROM CENTER CITY PHILADELPHIA. BE SURE TO COMPLETE EACH PAGE.

- How often do you usually travel to work in Center City Philadelphia?
(Check one Box)

| | |
|-----------------------------|----------------------------|
| Three days per week or less | <input type="checkbox"/> 1 |
| Four days per week | <input type="checkbox"/> 2 |
| Five days per week | <input type="checkbox"/> 3 |
| Six or seven days per week | <input type="checkbox"/> 4 |
- How often do you usually leave your place of work during the lunch hour or at other times during the workday for the purpose of:

| | | | | | |
|----------------------------|---------------------------------------|----------------------------|-------------------------------|----------------------------|----------------------------|
| | <i>Eat Meals</i> | <i>Shopping</i> | <i>Midday Work Activities</i> | <i>Entertainment</i> | <i>Other</i> |
| | <i>(Check one Box in each Column)</i> | | | | |
| Less than once per week | <input type="checkbox"/> 1 | <input type="checkbox"/> 1 | <input type="checkbox"/> 1 | <input type="checkbox"/> 1 | <input type="checkbox"/> 1 |
| One day per week | <input type="checkbox"/> 2 | <input type="checkbox"/> 2 | <input type="checkbox"/> 2 | <input type="checkbox"/> 2 | <input type="checkbox"/> 2 |
| Two or three days per week | <input type="checkbox"/> 3 | <input type="checkbox"/> 3 | <input type="checkbox"/> 3 | <input type="checkbox"/> 3 | <input type="checkbox"/> 3 |
| Four or five days per week | <input type="checkbox"/> 4 | <input type="checkbox"/> 4 | <input type="checkbox"/> 4 | <input type="checkbox"/> 4 | <input type="checkbox"/> 4 |
| Six or seven days per week | <input type="checkbox"/> 5 | <input type="checkbox"/> 5 | <input type="checkbox"/> 5 | <input type="checkbox"/> 5 | <input type="checkbox"/> 5 |
- How often do you travel from your home to Center City on non-work trips such as shopping, entertainment, doctor visits, etc.?

| | |
|---------------------------------|----------------------------|
| Once a month or less | <input type="checkbox"/> 1 |
| Twice a month | <input type="checkbox"/> 2 |
| Three to five times per month | <input type="checkbox"/> 3 |
| Six to fifteen times per month | <input type="checkbox"/> 4 |
| Sixteen or more times per month | <input type="checkbox"/> 5 |
- What time do you normally:

| | | |
|-----------------------------|--------------------------------------|---------------------------------------|
| | <i>Leave your home to go to work</i> | <i>Begin your trip home from work</i> |
| | <i>(Check one Box)</i> | |
| 12:00 AM to 6:00 AM | <input type="checkbox"/> 1 | <input type="checkbox"/> 1 |
| 6:01 AM to 9:00 AM | <input type="checkbox"/> 2 | <input type="checkbox"/> 2 |
| 9:01 AM to 3:30 PM | <input type="checkbox"/> 3 | <input type="checkbox"/> 3 |
| 3:31 PM to 6:30 PM | <input type="checkbox"/> 4 | <input type="checkbox"/> 4 |
| 6:31 PM to 9:00 PM | <input type="checkbox"/> 5 | <input type="checkbox"/> 5 |
| 9:01 PM to 12:00 (Midnight) | <input type="checkbox"/> 6 | <input type="checkbox"/> 6 |
- What is the average time it takes you to travel (door-to-door) from:

| | | |
|----------------------|----------------------------|----------------------------|
| | <i>Home to Work</i> | <i>Work to Home</i> |
| | <i>(Check one Box)</i> | |
| Up to 15 minutes | <input type="checkbox"/> 1 | <input type="checkbox"/> 1 |
| 16 to 25 minutes | <input type="checkbox"/> 2 | <input type="checkbox"/> 2 |
| 26 to 35 minutes | <input type="checkbox"/> 3 | <input type="checkbox"/> 3 |
| 36 to 45 minutes | <input type="checkbox"/> 4 | <input type="checkbox"/> 4 |
| 46 to 60 minutes | <input type="checkbox"/> 5 | <input type="checkbox"/> 5 |
| 61 to 90 minutes | <input type="checkbox"/> 6 | <input type="checkbox"/> 6 |
| More than 90 minutes | <input type="checkbox"/> 7 | <input type="checkbox"/> 7 |
- What is your usual means of transportation from home to work?

| | |
|-------------------------------|---|
| | <i>Check one Box next to the Means that carries you into Center City.</i> |
| Drive alone | <input type="checkbox"/> 1 |
| Carpool (two or more persons) | <input type="checkbox"/> 2 |
| Vanpool | <input type="checkbox"/> 3 |
| Bus or Trolley | <input type="checkbox"/> 4 |

FIGURE 1 Survey questionnaire.

- Subway-Surface 5
- Broad Street Subway, Market-Frankford or Lindenwold Line 6
- Commuter Rail (Regional High Speed Lines) 7
- Walk (only) 8
- Other (Specify) _____ 9

- Lower fares 9
- More courteous employees 10
- Improved cleanliness 11
- Better feeder service connections 12
- Additional and/or more secure parking 13
- Other (Specify) _____ 14

7. What is the total cost per day for you to travel from home to work and back (include transit fare, parking, tolls, gasoline, and car maintenance costs)?

- Free 1
- Less than \$1.50 2
- \$1.50 to \$2.00 3
- \$2.00 to \$3.00 4
- \$3.00 to \$5.00 5
- \$5.00 to \$8.00 6
- \$8.00 to \$12.00 7
- More than \$12.00 8

8. How long have you been using your usual means of transportation to work, that is, the one indicated in Question 6?

- Less than one year 1
- One to five years 2
- More than five years 3

9. What was your usual means of transportation to work prior to the one you use now?

- (Check one Box)*
- Did not work in Center City before 1
 - Drove alone 2
 - Carpool (two or more persons) 3
 - Vanpool 4
 - Bus or Trolley 5
 - Subway-Surface 6
 - Broad Street Subway, Market-Frankford or Lindenwold Line 7
 - Commuter Rail (Regional High Speed Lines) 8
 - Walk (only) 9
 - Other (Specify) _____ 10

CONFIDENTIALITY WILL BE MAINTAINED WITH REGARD TO INDIVIDUAL RESPONSES

10. If you changed your means of transportation, what were the reasons?

- (Check the most important reasons)*
- Did not work in Center City before 1
 - Changed place of residence 2
 - Transit service not on time 3
 - Reduced frequency of transit service 4
 - Increased or reduced fares 5
 - Automobile is now available 6
 - Automobile is no longer available 7
 - Attractive Carpool/Vanpool options 8
 - High parking rates 9
 - Improved transit service 10
 - Inadequate personal safety 11
 - Other (Specify) _____ 12

11. If you could use a commuter rail line but now commute by other means, what changes in the commuter rail system would make you use the railroad to travel to work?

- (Check the most important reasons)*
- More reliable service (on time) 1
 - Faster Trains 2
 - More frequent service during:
 - Morning Peak (6:00 AM-9:00 AM) 3
 - Midday (9:00 AM-4:00 PM) 4
 - Afternoon Peak (4:00 PM-6:00 PM) 5
 - Evening (6:00 PM-12:00 Midnight) 6
 - Night Time (12:00 Midnight-6:00 AM) 7
 - Better communications during breakdowns 8

IF YOU USE AUTO OR VAN TO COMMUTE TO YOUR PLACE OF WORK, ANSWER QUESTIONS 12 THROUGH 15.

12. How many people, including the driver, are typically in the car, truck, or van that carries you to work?

- (Check One Box)*
- | <i>Auto/Carpool</i> | <i>Vanpool</i> |
|---|---|
| One <input type="checkbox"/> 1 | Nine or less <input type="checkbox"/> 1 |
| Two <input type="checkbox"/> 2 | Ten to Eleven <input type="checkbox"/> 2 |
| Three <input type="checkbox"/> 3 | Twelve to Thirteen <input type="checkbox"/> 3 |
| Four <input type="checkbox"/> 4 | Fourteen or More <input type="checkbox"/> 4 |
| Five or More <input type="checkbox"/> 5 | |

13. If three or more persons are in the vehicle, do you usually meet at one central location?

- Yes 1 No 2

If yes, what is your meeting place?

- (Check one Box)*
- Train Station 1
 - Shopping Center 2
 - Church or Civic Center 3
 - My home or someone else's home 4
 - Other (Specify) _____ 5

14. If you drive a car to Center City, how much do you pay to park your vehicle per day?

- Free 1
- Less than \$2.00 2
- \$2.00-\$4.00 3
- \$4.01-\$5.00 4
- \$5.01-\$7.00 5
- \$7.01 or More 6

15. Why don't you use public transit to reach your work place?

- (Check the most important reasons)*
- Parking unavailable at transit stations 1
 - Transit service not on time 2
 - Infrequent transit service 3
 - Auto faster and more convenient 4
 - Poor condition of transit vehicles 5
 - Crowded transit vehicles 6
 - High fares 7
 - Inadequate police protection 8
 - Doesn't take me to my work place 9
 - Have company car and/or parking space 10
 - Auto required for work-related activity 11
 - Other (Specify) _____ 12

IF YOU USE PUBLIC TRANSPORTATION TO COMMUTE TO YOUR PLACE OF WORK, ANSWER QUESTIONS 16 THROUGH 21.

16. From your home, how do you reach the public transportation facility that carries you to Center City?

- (Check one Box)*
- Walk (only) 1
 - Drive auto and park 2
 - Ride with someone who parks 3
 - Someone drops me off 4
 - Bus or Trolley 5
 - Other (Specify) _____ 6

FIGURE 1 (continued)

17. Do you transfer to another public transportation facility within Center City?
 Yes 1, No 2

If yes, to what?

- (Check one Box)
- Commuter Rail 1
 - Subway/Elevated 2
 - Trolley or Bus 3
 - Other (Specify) _____ 4

18. If you ride the Commuter Rail System, which Center City station have you used before and after the opening of the Center City Commuter Tunnel?

- (Check one Box in Each Column)
- | | Before | After |
|--------------------|----------------------------|----------------------------|
| Reading Terminal | <input type="checkbox"/> 1 | |
| Market Street East | | <input type="checkbox"/> 2 |
| Suburban Station | <input type="checkbox"/> 3 | <input type="checkbox"/> 4 |
| 30th Street | <input type="checkbox"/> 5 | <input type="checkbox"/> 6 |

19. If you regularly ride the commuter rail system and don't use a weekly or monthly TrailPass, what are your reasons for not using it?

- (Check the most important reasons)
- I don't know about the TrailPass. 1
 - I do not ride the railroad frequently enough. 2
 - It limits my options to drive, carpool, vanpool or take public transit. 3
 - I frequently travel at non-peak times, when bargain fares are in effect. 4
 - I cannot afford to pay a month's or week's fare at one time. 5
 - I don't have occasion to use SEPTA subways, buses or trolleys. 6
 - Other (Explain) _____ 7

20. If you regularly ride SEPTA's subway, bus, or trolley routes and don't use a weekly or monthly TransPass, what are your reasons for not buying it?

- (Check the most important reasons)
- I don't know about the TransPass. 1
 - I do not ride SEPTA frequently enough. 2
 - There are no convenient sales locations. 3
 - I cannot afford to purchase the TransPass. 4
 - I buy the TrailPass instead. 5
 - I buy tokens instead. 6
 - Other (Specify) _____ 7

21. If you regularly ride NJT and don't use an Interstate Monthly Bus Pass, what are your reasons for not using it?

- (Check the most important reasons)
- I don't know about the Interstate Monthly Bus Pass. 1
 - I do not ride NJT frequently enough. 2
 - There is no convenient sales location. 3
 - I cannot afford to purchase a monthly Pass. 4
 - I prefer a ten-trip ticket. 5
 - Other (Specify) _____ 6

FIGURE 1 (continued)

Trip Characteristics

Questions 1 through 5 and Question 7 solicit information on the frequency of work trips, other trips made during the workday, nonwork trips from home, time of departure from home and return from work, duration of home-to-work and return trips, and the daily cost of work trips. Question 6 and Questions 8 through 10 were designed to collect information about existing travel modes, duration of use, previous means of transportation, and reason, if any, for change of mode. Question 11, directed toward commu-

EVERYONE ANSWER QUESTIONS 22 THROUGH 30.

22. How long have you worked at your present Center City job location?

- Less than one year 1
- One year to five years 2
- More than five years 3

23. If your employment address has changed within the last five years, where did you previously work?

- (Check one Box)
- Center City Philadelphia 1
 - Philadelphia Outside of Center City 2
 - The Pennsylvania Suburbs 3
 - Southern New Jersey 4
 - Other (Specify) _____ 5

24. Sex:

- Male 1, Female 2

25. What is your age?

- Under 18 1, 18-34 2, 35-44 3
- 45-54 4, 55-64 5, 65 or over 6

26. What is your household income?

- Under \$15,000/year 1
- \$15,000-25,000/year 2
- \$25,000-35,000/year 3
- \$35,000-50,000/year 4
- \$50,000 or more/year 5

27. How many cars are available to members of your household?

- None 1, One 2, Two 3, Three or more 4

28. How many drivers live in your household?

- One 1, Two 2, Three 3, Four 4, Five or more 5

29. My home address is:

No. _____ Street _____
 Municipality _____ County _____ Zip Code _____

30. My work address is:

No. _____ Street _____ City _____ Zip Code _____

THANK YOU FOR YOUR HELP
 PLEASE FOLD, TAPE OPEN EDGE, AND MAIL.

ters who can but do not use commuter rail, tries to elicit respondents' reasons for not doing so.

Usage of Highway and Public Transit Facilities

Questions 12 through 15 are directed toward users of the highway system--private automobile, carpool, and vanpool. These questions are related to vehicle occupancy, location for collecting passengers (for car- and vanpools), parking costs, and reasons for not using the public transit system. Questions 16

and 17 are for existing users of the transit mode. Information is requested about the mode used to access the transit system and the means of transfer to other modes within Center City, if any. Question 18, directed at commuter rail riders, is intended to determine the downtown stations patronized by them before and after the opening of the commuter tunnel in Center City, in order to assess the impact of this new major facility. Questions 19 through 21 seek to determine reasons for not using the TrailPass, TransPass, and New Jersey Transit Interstate Pass. Questions 22 and 23 asked all employees the duration of work at their present location, and the previous work location if they had been at their present location less than 5 years.

Socioeconomic Characteristics

Socioeconomic information was requested in Questions 24 through 28 and is related to the sex, age, household income, vehicle ownership, and number of drivers in the household of the respondent. The purpose of asking these questions was to build a basis for making comparisons among respondents. For example, by cross-checking responses, determinations could be made about whether a given age or income group is more likely to drive to work than take public transit or if the number of drivers in a household affects this statistic in any way.

Place of Work and Residence

The purpose of the last two questions was to determine where Center City employees live and work. Question 29 asked for the address, municipality, county, and zip code of residence. Question 30 asked the survey respondent to specify the street address and zip code of place of work. Center City Philadelphia was divided into eight neighborhoods before distribution of the questionnaires (Figure 2). In this way relationships could be formed among work

location, home address, and travel mode to and from work in Center City.

SAMPLE DESIGN AND SIZE

A sample of Center City employees was selected for the distribution of survey questionnaires. In consideration of practicality, administration, and cost, a cluster sampling procedure was employed. A simple random sample was drawn from each of the eight neighborhoods shown in Figure 2, and every employee had an equal probability of being included in the sample. The statistics obtained from the random sample were then used to draw conclusions about the total work force.

The design of the sample size was based on the 1980 census employment estimates contained in the 1980 Urban Transportation Planning Package (UTPP), prepared by the Bureau of the Census for the Delaware Valley region (1). According to the UTPP, the number of workers in the Philadelphia central business district (CBD) is about 236,000. It should be noted, however, that the number of workers by place of work included in the UTPP is lower than the number of jobs because of omission from the count of second job holders and workers who were absent from work on the census day because of illness, vacation, or other personal reasons. As seen from Figure 2, the eight neighborhoods are not of equal size. However, the number of jobs located in a large neighborhood is not necessarily large, as the data in Table 1 indicate.

According to the UTPP, the largest number of jobs in Central City Philadelphia is in the service sector (33.5 percent), followed by finance, insurance, and real estate (19.6 percent), wholesale and retail (15.1 percent), and the construction and manufacturing sector (13.6 percent). The transportation, communications, and utilities sector provides 9.2 percent of the jobs, and public administration accounts for 8.6 percent. These proportions were accounted for in determining the sample size and composition for each neighborhood.

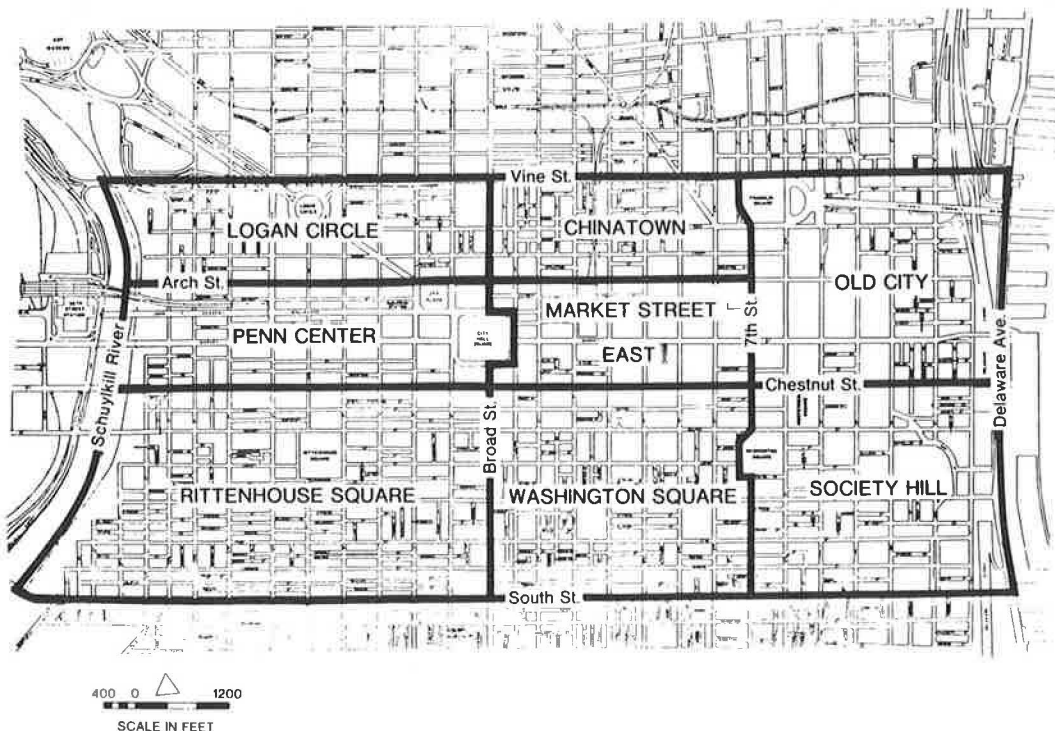


FIGURE 2 Philadelphia Center City core neighborhoods.

TABLE 1 Distribution of 1980 Philadelphia CBD Workers by Neighborhood (1)

| Neighborhood | No. of Employees | Percentage of Total |
|--------------------|------------------|---------------------|
| Logan Circle | 18,512 | 7.8 |
| Penn Center | 57,549 | 24.4 |
| Rittenhouse Square | 42,554 | 18.0 |
| Chinatown | 12,957 | 5.5 |
| Market Street East | 35,300 | 15.0 |
| Washington Square | 27,268 | 11.6 |
| Old City | 26,433 | 11.2 |
| Society Hill | 15,252 | 6.5 |
| Total | 235,825 | 100.0 |

The sample size was determined on the basis of specified levels of sampling error and confidence interval in the survey results. Statistical inference provides a relationship between sample error and the probability of obtaining this precision in the survey results (2,3). This relationship is as follows:

$$h = [(z^2/n) (p \cdot q)]^{1/2}$$

where

- h = specified (tolerable) sampling error,
- z = confidence interval or the multiple of standard errors corresponding to the specified probability of obtaining the specified precision,
- n = sample size,
- p = probability that the population possesses certain characteristics, and
- q = 1 - p.

For the purpose of this survey, an error of ± 4 percent was specified at a confidence interval of 95 percent ($z = 1.96$), and p equals 0.5. Under these assumptions, the equation yields a sample size of about 600.

Accounting for the respondents who do not return the completed questionnaires (assumed 50 percent), and those whose responses have to be disregarded because of errors or inaccuracies (assumed 5 percent), a sample size of 1,265 was estimated for distribution in each of the eight neighborhoods within Center City Philadelphia. As the data in Table 2 indicate, the target sample size averages to 4.3 percent, with neighborhoods ranging from a minimum of 2.4 percent in the Penn Center area to a maximum of 9.7 percent in Chinatown. More than 10,200 employees were reached by the survey.

DISTRIBUTION OF QUESTIONNAIRES, RESPONSES, AND PROCESSING

As mentioned before, the survey questionnaires were distributed to employees through a random process.

The participants were reached in two ways. First, Center City companies employing 100 persons or more were chosen from the Business Firms Directory of the Delaware Valley, provided by the Greater Philadelphia Chamber of Commerce (4). This directory was used to compile listings of the corporate recipients of the questionnaires. In all, 91 companies representing various employment sectors were reached in this way. The number of questionnaires sent to the executives of the companies was proportional to the size of their work force. Company executives were reached through personal contact or by letter and were requested to distribute about 8,000 questionnaires to their employees. Many companies appointed special liaisons to distribute, collect, and return the questionnaires to DVRPC.

Second, the remaining 2,200 questionnaires were distributed by DVRPC staff to employers of fewer than 100 persons. These were also selected at random from the Business Directory. The employees were requested to mail back the completed questionnaires. Although the completed questionnaires could be mailed back without postage, some companies delivered their responses personally.

Response Rate

The response to the survey was excellent. Table 2 gives the number of valid responses by neighborhood. In all, 4,219 questionnaires were found acceptable for data processing after being manually checked for invalid forms. The accepted questionnaires constituted a 1.8 percent sample of the total workers within Center City. The rate of return varied from 25.6 percent in Chinatown to 60.2 percent in Penn Center and averaged 41.3 percent.

Data Processing

In view of the large number of questionnaires returned and the quantity of information collected therefrom, the data processing was done by computer. The major steps followed in processing the data and preparing the survey results are outlined next.

1. All questionnaires were examined individually and those with apparent mistakes were discarded. The remaining questionnaires were then keypunched according to a specified record layout. The responses to the questions were coded in 76 fields of 88 columns using the specified codes.

2. The format of the computer results was designed for each question. Wherever appropriate, additional information about averages was included in the output (e.g., average trips per week, average age, car- or vanpool occupancy). The responses (proportions) were tabulated for each of the eight sections in which the final output was organized.

TABLE 2 Questionnaires Distributed and Valid Responses Received

| Center City Neighborhood | No. of Employees | | | Valid Responses Received | Percentage of Total | Percentage of Samples |
|--------------------------|------------------|---------|------------|--------------------------|---------------------|-----------------------|
| | Total | Sampled | Percentage | | | |
| Logan Circle | 18,512 | 1,265 | 6.8 | 616 | 3.3 | 48.9 |
| Penn Center | 57,549 | 1,363 | 2.4 | 821 | 1.4 | 60.2 |
| Rittenhouse Square | 42,554 | 1,265 | 3.0 | 348 | 0.8 | 27.6 |
| Chinatown | 12,957 | 1,265 | 9.7 | 323 | 2.5 | 25.6 |
| Market Street East | 35,300 | 1,267 | 3.6 | 515 | 1.5 | 40.8 |
| Washington Square | 27,268 | 1,266 | 4.6 | 555 | 2.0 | 43.9 |
| Old City | 26,433 | 1,267 | 4.8 | 486 | 1.8 | 38.5 |
| Society Hill | 15,252 | 1,267 | 8.3 | 555 | 4.5 | 43.9 |
| Entire Center City | 235,825 | 10,225 | 4.3 | 4,219 | 1.8 | 41.3 |

3. A previous DVRPC FORTRAN program was rewritten to process the information in the desired format. Contingency checks were included within this program to consider correct responses and leave out those that were inconsistent with the intent of the questionnaire. For example, the information in Questions 12 through 15 was compiled only if the existing mode of the respondent indicated in Question 6 was highway oriented (i.e., drive alone, carpool, or vanpool). The program was edited, debugged, and tested on a smaller data set, and the results were verified by manual calculations. After additional improvements were made in the output content and format, the program was run on the total data set.

SURVEY RESULTS

The survey results were tabulated in a series of eight detailed sections that showed the percent response and the sampling error associated with each answer to the questionnaire. It should be noted that the sampling error is high if the number of responses to a question is small (Figure 3). Although the survey was designed to restrict the sampling error to ±4 percent, a few responses did fall outside these sampling error limits. A brief discussion of the responses to each of the 30 questions asked in the survey follows.

Frequency of Weekly Work and Nonwork Trips and Trips During the Day

1. The vast majority of Center City employees (88 percent) commutes to work 5 days per week. Only 7 and 5 percent of the employees commute either more or less often than 5 days per week, respectively. Overall, 4.9 trips are made by the average employee every week, which reflects relatively stable and full-time employment. The frequency of work trips,

however, varies inversely with the distance traveled from the place of residence to Center City.

2. Center City employees indicated leaving work for meals on the average of 2.5 times per week. This occurred almost twice as frequently as shopping (1.4 times per week on the average). Work-related activities required the employee to leave the work place about 1.1 times a week, and trips for entertainment purposes averaged only 0.7 time per week. About one-third of the employees (34 percent) eat out 4 or 5 days a week. Shopping is a rather infrequent activity during the workday--43 percent of the employees shop less frequently than once a week. Entertainment was cited as a reason to leave the work place less frequently than once a week by 88 percent of the employees. Travel within Center City during the workday for work-related activities showed a rather low frequency, with nearly 7 of 10 employees (68 percent) traveling less than once a week and only 18 percent more than twice per week.

3. As expected, not many Center City employees travel from home to Center City for nonwork purposes. On the average, they make about three trips per month. More than half of the employees (53 percent) make one trip or less per month, and only 4 percent make more than 16 such trips. Nearly equal proportions of employees, 16 and 18 percent, make two and three trips per month, respectively. Another 9 percent make between 6 and 15 trips per month to Center City for nonwork activities.

Time of Leaving Home and Work and Door-to-Door Travel Time

4. The morning peak travel period to Center City occurs between 6:00 a.m. and 9:00 a.m., when 93 percent of the employees commute to work. In the afternoon peak period, between 3:30 p.m. and 6:30 p.m., 90 percent of the employees return to their homes. The off-peak hours attract the remaining 7

PHILADELPHIA CENTER CITY
EMPLOYEES TRANSPORTATION SURVEY
FINAL RESULTS: JUNE 14, 1985.

PERCENT RESPONSE / SAMPLING ERROR

| | PLACE OF WORK | | | | | | | |
|---|---------------|------|--------|--------|--------|--------|-----------|--------|
| | TOTAL | | LOGAN | | PENN | | RITTEN HS | |
| | CENTER | CITY | CIRCLE | CIRCLE | CENTER | CENTER | SQUARE | SQUARE |
| RESPONSES | 4219 | | 616 | | 821 | | 348 | |
| 1. HOW OFTEN DO YOU USUALLY TRAVEL TO WORK IN CENTER CITY PHILADELPHIA? | | | | | | | | |
| THREE DAYS PER WEEK OR LESS | 3 | 1 | 2 | 1 | 3 | 1 | 6 | 2 |
| FOUR DAYS PER WEEK | 4 | 1 | 3 | 1 | 6 | 2 | 6 | 3 |
| FIVE DAYS PER WEEK | 88 | 1 | 90 | 2 | 88 | 2 | 84 | 4 |
| SIX OR SEVEN DAYS PER WEEK | 5 | 1 | 5 | 2 | 3 | 1 | 4 | 2 |
| TOTAL RESPONSES | 100 | 0 | 100 | 0 | 100 | 0 | 100 | 0 |
| NO RESPONSE | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 |
| AVERAGE TRIPS PER WEEK (X 10) | 49 | | 50 | | 49 | | 48 | |
| 2. HOW OFTEN DO YOU LEAVE YOUR PLACE OF WORK FOR THE PURPOSE OF: | | | | | | | | |
| A. EATING MEALS: | | | | | | | | |
| LESS THAN ONCE PER WEEK | 25 | 1 | 28 | 4 | 22 | 3 | 21 | 5 |
| ONE DAY PER WEEK | 14 | 1 | 15 | 3 | 14 | 3 | 13 | 4 |
| TWO OR THREE DAYS PER WEEK | 26 | 1 | 28 | 4 | 26 | 3 | 24 | 5 |

FIGURE 3 Final results of Philadelphia Center City employees transportation survey, June 14, 1985.

percent of trips from home to work and 10 percent from work to home.

5. The average trip from home to work takes 42 min, and the trip from work to home is 3 min longer. About 44 percent of the employees spend more than 90 min (45 min each way) commuting to and from work. Nearly one in seven employees spends more than 1 hr commuting from home to work in Center City (Figure 4). Travel time from home to work varies significantly by mode of travel. On the average, it takes 36, 38, 55, 42, 45, and 52 min to commute to Center City by automobile, carpool, vanpool, bus or trolley, subway-elevated, and commuter rail, respectively.

Means of Transportation and Travel Costs of Work Trips

6. Sixty-two percent of employees use public transportation to go to work in Center City. The commuter rail system carries 17 percent of the employees (Figure 4). The subway-elevated and Lindenwold high-speed lines accommodate 23 percent. Eighteen percent of the workers ride a bus or trolley, and 4 percent patronize SEPTA's subway-surface lines. Nearly one in three employees drives alone (19 percent), carpools (11 percent), or vanpools (2 percent) to work. Except for the data on drive-alone and subway-elevated work trips, the survey findings on travel modes are consistent with those contained in the 1980 UTPP, as shown in the following tabulation.

| Mode of Travel | Percentage of Center City Employees | |
|--------------------------|-------------------------------------|-------------------|
| | 1980 Census UTPP | 1985 DVRPC Survey |
| Commuter rail | 18 | 17 |
| Subway-elevated | 17 | 23 |
| Bus or trolley (surface) | 24 | 22 |
| Drive alone | 22 | 19 |
| Carpool | 10 | 11 |
| Truck and van | 2 | 2 |
| Walk | 6 | 4 |
| Other | 1 | 2 |
| Total | 100 | 100 |

7. It costs the average employee \$3.58 per day to commute to and from work. This cost accounts for transit fares, parking fees, tolls, gasoline, automobile maintenance, and so forth. The cost for 45 percent of the employees is more than \$3 per day. For nearly one-half of the employees (49 percent), however, the daily commuting cost is between \$1.50 and \$3.00. Six percent of the respondents did not report any cost for the work trip. This category includes employees who walk or use bicycles and those whose commuting costs are paid by their employers. Except for commuter rail, the cost of commuting by public transportation is less than that of driving to work. On the average, it costs \$4.79, \$4.46, \$3.79, \$2.33, \$2.83, and \$4.58 to commute to work by automobile, carpool, vanpool, bus or trolley, subway-elevated, and commuter rail, respectively.

Duration of Use of Travel Mode and Previous Means of Transportation

8. In general, the Center City employee's choice of travel mode to commute to work is stable over time; the average time for using a travel mode is 4.4 years. Only 18 percent of the employees have used their present travel mode for less than 1 year. Forty-one percent have used the same mode for from 1 to 5 years, and 40 percent for more than 5 years.

9. A significant proportion of the employees (37 percent) did not work in Center City before their present jobs. Other responses indicating previous mode of travel, in order of importance, were bus, trolley or subway-surface (15 percent), subway-elevated and Lindenwold line (12 percent), drive alone (12 percent), and commuter rail (11 percent). Six and 1 percent of the employees, respectively, had previously carpooled or vanpooled.

Reasons for Changing Travel Mode and Operational Changes for Increasing Commuter Rail Ridership

10. Center City employees primarily made a shift in mode or modes of travel to work because they had changed place of employment (25 percent) or place of residence (15 percent). Transit unreliability (10 percent), transit fare hikes (7 percent), high parking cost (7 percent), and attractive carpools and vanpooling (6 percent) were also cited as concerns that caused employees to change their means of transportation to work.

11. More reliable service and lower fares were cited as the two most important reasons (19 percent each) for increasing ridership on the commuter rail lines. In addition, those non-rail users who reside reasonably close to a rail station indicated that more frequent service during the morning rush hour (12 percent), better communication during breakdowns (10 percent), and improved vehicle cleanliness (6 percent) would encourage them to use the commuter rail system for work trips.

Automobile Drivers, Carpools, Vanpool Vehicle Occupancy, Parking Cost, and Reasons for Not Using Public Transit

12. Fifty-six percent of the automobile commuters drive alone to work, and only 6 percent rideshare in carpools of four or more passengers (Figure 5). Slightly more than 6 in 10 vanpoolers (64 percent) rideshare in vans with 10 to 13 passengers. The average car- and vanpool occupancies are 1.3 and 12.1 persons, respectively.

13. Slightly more than one-half of the employees (54 percent) who commute to work in vanpools and carpools carrying three or more persons meet at a central location to depart for Center City. A rider's home is the usual meeting place for 62 percent of those employees, and 18 and 12 percent, respectively, use shopping centers or commuter rail stations.

14. Of those employees who drive to work in automobiles, one-third pay no parking cost, 31 percent pay daily fees of between \$2.00 and \$4.00, and 23 percent pay more than \$4.00 (Figure 5). Overall, the average parking cost is \$2.33 per day.

15. The automobile's superiority as a faster and more convenient mode of travel to work was cited by employees as the major reason (28 percent) for not taking public transportation to work. However, 52 percent of the employees cited several deficiencies in transit service that caused them to use other means of transportation. High fares (12 percent), service unreliability (12 percent), overcrowded vehicles (10 percent), and infrequency of service (8 percent) were claimed as the major reasons for not using public transit.

Home Access Mode to Public Transit, Center City Transfer, and Usage of Center City Stations

16. Forty-one percent of the employees walk to a train station or bus stop to board the transit modes that carry them to Center City. Nearly one in three employees (32 percent) drives an automobile from home

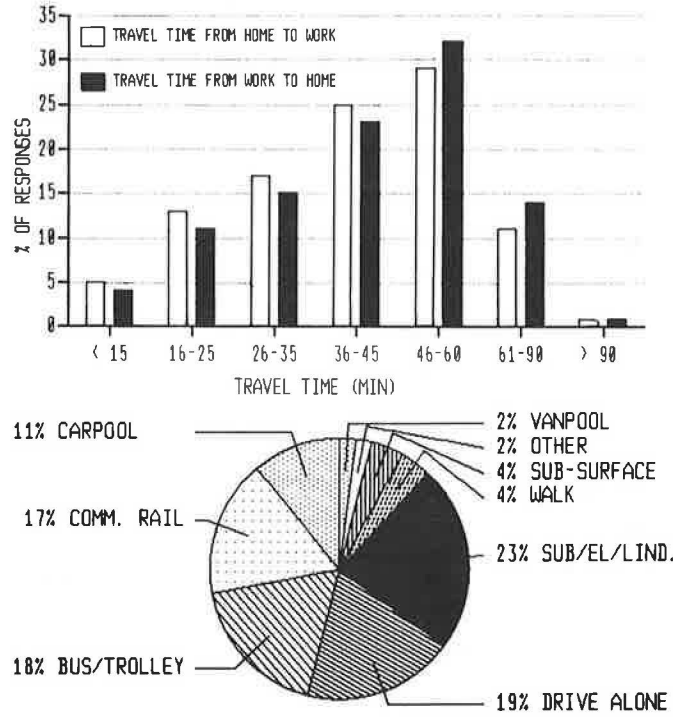


FIGURE 4 Workers' travel time and means of transportation.

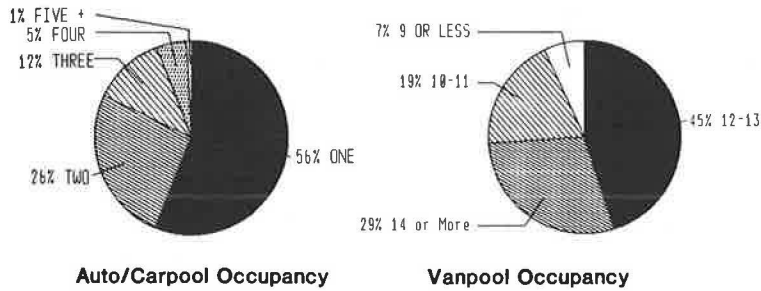


FIGURE 5 Automobile drivers, carpools, vanpools, and parking cost.

and parks adjacent to the station before boarding a train, subway, or bus. In addition, one in five employees arrives at a transit station by bus or trolley, and 6 percent are driven by someone else (kiss 'n ride).

17. The overwhelming majority of employees who commute by public transportation (81 percent) walks to their destinations once they arrive in Center City. About 2 in 10 (19 percent) transfer to another transit mode within Center City. SEPTA's subway-ele-

vated and bus and trolley lines accommodate 57 and 37 percent of those employees, respectively.

18. The responses of the 17 percent of employees who ride the commuter rail system indicate that there has been no significant change in the percentages of passengers who use Center City stations. About 36 percent of the commuters used Reading Terminal before the opening of the tunnel, and 38 percent use Market East station at the present time. Because the tunnel has connected the Philadelphia and Reading railroad

systems, passengers now arrive at a station closer to their place of work.

Reasons for Not Using TrailPasses, TransPasses, and New Jersey Transit Bus Passes

19. It appears that the SEPTA's TrailPass is well advertised; only 2 percent of the respondents indicated a lack of knowledge of it. The major reasons for not using the TrailPass include not riding the commuter rail system frequently enough (20 percent), use of bargain fares during off-peak hours (12 percent), and inability to pay a month's or a week's fare in advance (7 percent). Fifteen percent of the rail commuters said that they did not have occasion to use SEPTA's other transit systems, and 17 percent said it would limit their travel options.

20. The two most important reasons for not using SEPTA's TransPass fare program are purchase of tokens (56 percent) and infrequency of transit use (20 percent). However, 5 percent claimed inconvenience of sales locations as a reason for not buying the TransPass. Another 5 percent of the transit users said that they cannot afford to purchase the TransPass.

21. The 10-trip ticket is the most popular fare program among New Jersey commuters and is purchased by 34 percent of N.J. Transit's interstate bus riders. Insufficient information about the Interstate Monthly Bus Pass (19 percent) and inconvenient sales locations (16 percent) deter commuters from using the discounted fares. Another 12 percent believe that the cost of the monthly bus pass is too much to pay at one time. Not riding the bus frequently enough was cited by 16 percent of the riders who do not purchase the N.J. Transit pass.

Duration of Employment in Center City and Previous Work Location

22. Nearly one-half of the employees (44 percent) have worked at their present location for more than 5 years, and about 16 percent have worked in Center City for less than 1 year. The remaining 39 percent indicated that they have been employed at their present location between 1 and 5 years.

23. About one of three employees (34 percent) who have changed work location within the past 5 years moved from another Center City location. Nearly one-quarter (24 percent) came from other sections in the city of Philadelphia. Seventeen and 7 percent, respectively, came to Center City from either the Pennsylvania or the New Jersey suburbs. It should be noted, however, that only 18 percent moved to Center City from areas outside the nine-county DVRPC region.

Employees' Sex and Age, Household Income, Automobile Ownership, and Number of Drivers in the Household

24 and 25. Philadelphia's Center City workers are 57 percent female and 43 percent male. The average male employee is 39 years old, and the average age for the female is 35 years. About three of four employees (73 percent) are older than 18 and younger than 44 years of age. In the age group of 35 to 44, there are slightly more men than women (29 versus 24 percent). In the 18 to 34 group, women outnumber men (55 versus 37 percent). According to the 1980 UTPP, 52 percent of Center City workers were male and 48 percent were female. These figures are significantly different from the DVRPC survey findings.

26. Although 43 percent of the employees reported

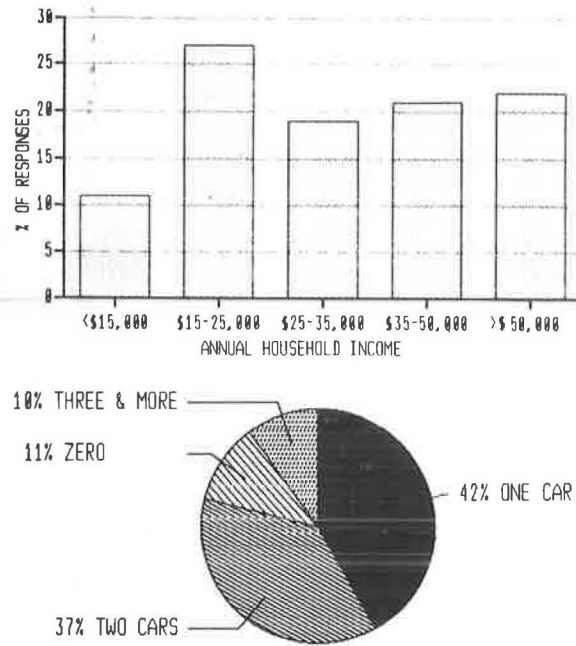


FIGURE 6 Household income and automobile ownership.

household incomes higher than \$35,000 per year, the average household income of all employees is \$35,260 per year (Figure 6). The highest household income was reported by employees from Chester County (\$55,270), and the lowest was indicated by Philadelphia residents (\$28,880). The average annual household income for female employees is about 33 percent less than the corresponding income of males (\$30,870 versus \$41,090). Household income of Center City employees increased significantly during the past 6 years, from \$26,482 in 1979, reported in the 1980 UTPP, to \$35,260 in 1985, found in this survey.

27. Only 1 in 10 employees (11 percent) does not own an automobile (Figure 6). Forty-two percent reported owning a single automobile, and 10 percent own three or more automobiles. On the average, there are 150 automobiles per 100 households; however, this rate varies significantly among employees depending on place of residence. For example, there are 210 automobiles per 100 households among the employees who reside in Bucks or Chester counties, but the corresponding rate for Philadelphia residents is 120 automobiles. Like income, household automobile ownership has increased from the 1980 level. The following tabulation indicates this trend:

| No. of Automobiles Available | Percentage of Employees by Household Automobile Ownership Level | |
|------------------------------|---|-------------------|
| | 1980 Census UTPP | 1985 DVRPC Survey |
| 0 | 18 | 11 |
| 1 | 40 | 42 |
| 2 | 31 | 37 |
| 3 or more | 11 | 10 |
| Total | 100 | 100 |

28. There are two automobile drivers in more than one-half of the employees' households (54 percent). More than one-fourth of the households (27 percent) have one driver, 12 percent have three drivers, and 7 percent have four or more drivers. This high number of drivers per household indicates a strong tendency to use the highway system for commuting to work.

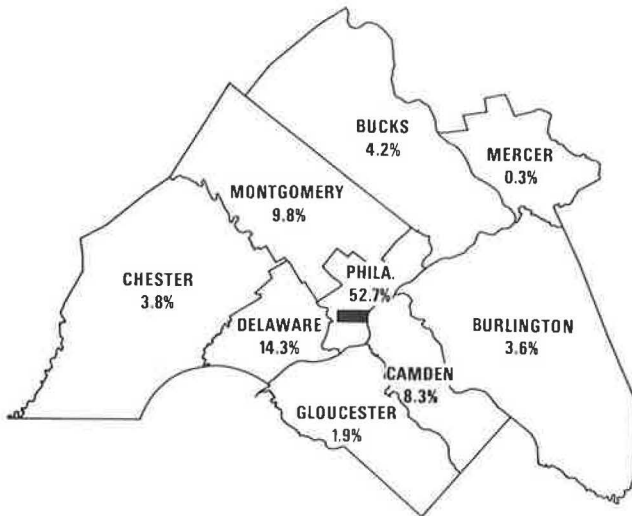


FIGURE 7 Workers' place of residence.

Place of Residence and Work

29. Only 1 percent of Center City jobs are held by workers who are not residents of the Delaware Valley region. Slightly more than one-half of the jobs are held by residents of the city of Philadelphia (Figure 7). Suburbanites from Pennsylvania and New Jersey hold 32.1 percent and 14.1 percent of the jobs, respectively. Philadelphia's share of Center City jobs has declined as shown in the following tabulation, which compares the 1980 UTPP data with those found in this survey.

| Worker's Place of Residence | Percentage of Center City Employees | |
|-----------------------------|-------------------------------------|-------------------|
| | 1980 Census UTPP | 1985 DVRPC Survey |
| Bucks County | 3.3 | 4.2 |
| Chester County | 2.0 | 3.8 |
| Delaware County | 10.7 | 14.3 |
| Montgomery County | 8.4 | 9.8 |
| Philadelphia County | 61.4 | 52.7 |
| Burlington County | 3.0 | 3.6 |
| Camden County | 8.0 | 8.3 |
| Gloucester County | 1.9 | 1.9 |
| Mercer County | 0.2 | 0.3 |
| Other | 1.1 | 1.1 |
| Total | 100.0 | 100.0 |

30. According to the 1980 census UTPP, the total number of jobs in Center City was 264,000. Approximately 236,000 workers commute on an average weekday. Penn Center contains about 25 percent of Center City jobs (Figure 2). Other employment concentration areas are Rittenhouse Square (18 percent) and Market Street East (15.0 percent). These are followed by Washington Square (11.6 percent), Old City (11.2 percent), and Logan Circle (7.8 percent). Society Hill has the smallest employment concentration (6.5 percent).

FINDINGS AND CONCLUSIONS

The DVRPC Center City Employee Transportation Survey results provided essential information for the plan-

ning and programming of transportation improvements. In general, the survey results are consistent with those contained in the 1980 UTPP prepared by the Bureau of the Census. Some information, however, is only available from this comprehensive survey.

The average employee travels during the morning and evening peak hours; makes a few trips per week during the working day for meals, shopping, and entertainment purposes; and rarely goes to Center City from home for nonwork purposes. Because they do not ride public transit enough or use transit passes for all trip purposes, most commuters do not purchase the monthly or weakly passes. Although driving alone to work can be expensive, some employees do not ride public transit because they believe travel by automobile is faster and more convenient than transit, which is expensive, unreliable, and uncomfortable. Such information is important for the development of marketing programs to attract automobile users to transit and encourage the use of passes, which makes transit faster and more convenient.

The number of employees who work in Center City varies inversely with the travel time from their place of residence. Sixty-two percent of employees use public transportation to go to work in Center City, 32 percent use the highway system, and 6 percent walk or use other means of transportation. Such data, in addition to other survey findings on access and egress travel modes, place of residence and work, and employment locational changes, are being used to recalibrate DVRPC travel forecasting models and test the feasibility of additions, deletions, or improvements to transportation facilities in Center City and throughout the Delaware Valley region. They are also being used by the Philadelphia City Planning Commission to prepare a comprehensive master plan for Center City redevelopment.

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