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UMTA/TSC Project Evaluation Series

# The Minneapolis Ridesharing Commuter Services Demonstration



Evaluation Plan
May 1978

Service and Methods Demonstration Program

U.S. DEPARTMENT OF TRANSPORTATION
Urban Mass Transportation Administration
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16. Abstract

In April 1977, the Metropolitan Transit Commission initiated a two-year demonstration project designed to increase work trip-vehicle occupancy at selected employment sites in the Twin Cities region. Key elements of this demonstration which differentiate it from previous ridesharing promotion efforts are the reliance on a regional transit agency to serve as a broker in marketing, coordinating, and monitoring the program; the promotion of a wide range of ridesharing services including carpools, vanpools, and subscription bus; and the choice of multi-employer sites as the focus of the program. Three demonstration sites have been chosen, ranging in size from 3,600 to 7,700 employees. All of these sites are multi-employer complexes outside the Central Business District of Minneapolis.

The evaluation of the Commuter Services demonstration will have two main objectives. First, it is intended that the evaluation provide a detailed, chronological process description of the brokerage service. While some of the institutional, legal, and administrative issues involved in the demonstration will be a site-specific nature, the evaluation report should nonetheless serve as a reference guide to other interested agencies, indicating the type and range of issues they may confront in establishing a ridesharing brokerage service. The second major objective of this evaluation is to provide a statistically sound assessment of the results of the demonstration project. Issue areas to be analyzed include level-of-service changes, demand shifts, and the costs, productivities, and economics of the ridesharing modes promoted in the demonstration.

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## PREFACE

This document was prepared under Task Directive DOT-TSC-1405-2 as part of the Services and Methods Demonstration Program sponsored by the Urban Mass Transportation Administration's Office of Transportation Management and Demonstrations. This report presents an evaluation plan to measure the impacts of a ridesharing brokerage project at three multi-employer work sites in the Minneapolis metropolitan area. Under the project, the Metropolitan Transit Commission will coordinate a variety of brokerage functions which are designed to encourage increased ridership in high-occupancy vehicles to non-CBD work sites. The modes being promoted are carpooling, vanpooling, and subscription bus.

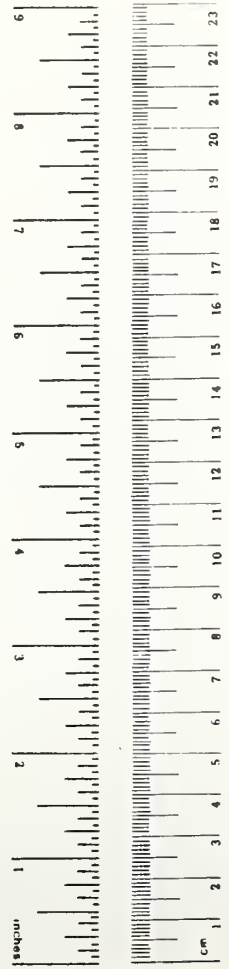
The implementation and evaluation activities are based on the anticipated project events at the time this plan was developed. This evaluation plan will be modified to reflect any changes in the project during the evaluation period.

The author would like to give acknowledgment to the patience and enthusiastic cooperation of several members of Commuter Services: Robert Pearson of the MTC Transit Development Division, Greg Westerbeck from MTC's Area Office, Clarence Shallbetter and Randi Alcott of Public Service Options, and Jeff Henning from Chrysler Corp.'s Vanpool Services. Valuable suggestions and guidance were also received from several individuals of the U.S. Department of Trnasportation: Grant Paul, Carla Heaton, Woody Studenmund, and Jim Poage from TSC; and Paul Fish from UMTA.

# METRIC CONVERSION FACTORS

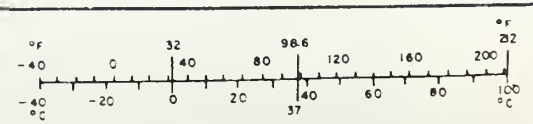
## Approximate Conversions to Metric Measures

| Symbol | When You Know | Multiply by | To Find | Symbol |
|---|---|---|---|---|
| | **LENGTH** | | | |
| in | inches | 2.5 | centimeters | cm |
| ft | feet | 30 | centimeters | cm |
| yd | yards | 0.9 | meters | m |
| mi | miles | 1.6 | kilometers | km |
| | **AREA** | | | |
| $in^2$ | square inches | 6.5 | square centimeters | $cm^2$ |
| $ft^2$ | square feet | 0.09 | square meters | $m^2$ |
| $yd^2$ | square yards | 0.8 | square meters | $m^2$ |
| $mi^2$ | square miles | 2.6 | square kilometers | $km^2$ |
| | acres | 0.4 | hectares | ha |
| | **MASS (weight)** | | | |
| oz | ounces | 28 | grams | g |
| lb | pounds | 0.45 | kilograms | kg |
| | short tons (2000 lb) | 0.9 | tonnes | t |
| | **VOLUME** | | | |
| tsp | teaspoons | 5 | milliliters | ml |
| Tbsp | tablespoons | 15 | milliliters | ml |
| fl oz | fluid ounces | 30 | milliliters | ml |
| c | cups | 0.24 | liters | l |
| pt | pints | 0.47 | liters | l |
| qt | quarts | 0.95 | liters | l |
| gal | gallons | 3.8 | liters | l |
| $ft^3$ | cubic feet | 0.03 | cubic meters | $m^3$ |
| $yd^3$ | cubic yards | 0.76 | cubic meters | $m^3$ |
| | **TEMPERATURE (exact)** | | | |
| °F | Fahrenheit temperature | 5/9 (after subtracting 32) | Celsius temperature | °C |




## Approximate Conversions from Metric Measures

| Symbol | When You Know | Multiply by | To Find | Symbol |
|---|---|---|---|---|
| | **LENGTH** | | | |
| mm | millimeters | 0.04 | inches | in |
| cm | centimeters | 0.4 | inches | in |
| m | meters | 3.3 | feet | ft |
| m | meters | 1.1 | yards | yd |
| km | kilometers | 0.6 | miles | mi |
| | **AREA** | | | |
| $cm^2$ | square centimeters | 0.16 | square inches | $in^2$ |
| $m^2$ | square meters | 1.2 | square yards | $yd^2$ |
| $km^2$ | square kilometers | 0.4 | square miles | $mi^2$ |
| ha | hectares (10,000 $m^2$) | 2.5 | acres | |
| | **MASS (weight)** | | | |
| g | grams | 0.035 | ounces | oz |
| kg | kilograms | 2.2 | pounds | lb |
| t | tonnes (1000 kg) | 1.1 | short tons | |
| | **VOLUME** | | | |
| ml | milliliters | 0.03 | fluid ounces | fl oz |
| l | liters | 2.1 | pints | pt |
| l | liters | 1.06 | quarts | qt |
| l | liters | 0.26 | gallons | gal |
| $m^3$ | cubic meters | 35 | cubic feet | $ft^3$ |
| $m^3$ | cubic meters | 1.3 | cubic yards | $yd^3$ |
| | **TEMPERATURE (exact)** | | | |
| °C | Celsius temperature | 9/5 (then add 32) | Fahrenheit temperature | °F |



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# 1. DEMONSTRATION PROJECT SUMMARY

## 1.1 PURPOSE OF DEMONSTRATION

As metropolitan areas have changed from a primarily urban environment to include an ever larger suburban population, conventional transit has been increasingly unable to serve area travel patterns. While population dispersion is by now a commonly recognized trend of metropolitan development, the decentralization of metropolitan employment is less publicized. Yet in the Twin Cities area--by no means unique in its recent development--nearly 85% of metropolitan area jobs are located outside the Central Business District. As a result, the great majority of commuters have their work trip begin and end in suburban areas and non-CBD central city areas with population and employment densities too low to support conventional transit service. Not surprisingly, intra-surban work commuters must rely almost exclusively on the automobile for their work travel. Over 90% of Twin Cities area work trips are by automobile, 80% by drive-alone commuters.

Increasing attention is now being focused on measures to increase vehicle occupancy for the rapidly expanding number of suburban work trips. Ridesharing programs promoting carpooling, vanpooling, and subscription and regular bus services are an integral part of this effort.

The benefits of ridesharing are varied and broadly distributed. To the commuter, ridesharing may offer an inexpensive, convenient, alternative to driving alone, and in some cases may decrease travel time as well as travel cost. To the community, a successful ridesharing program has the potential of decreasing fuel consumption, air pollution, and traffic congestion and increasing the utilization of existing highway

facilities, thereby reducing capital requirements. To employers, ride-sharing programs may decrease the costs of providing and maintaining parking facilities, free space for plant expansion and increase the area from which they can attract employees.

The overall purpose of this demonstration project is to develop and implement a coordinated and comprehensive prototype ridesharing program marketed under the name "Commuter Services." The specific focus of the demonstration is at three multi-employer sites located outside the Minneapolis/St. Paul Central Business Districts. The program is an outgrowth of recent legislation passed by the Minnesota Legislature which charged the Twin Cities regional transit agency, the Metropolitan Transportation Commission (MTC) with promoting the use of carpools and vanpools as well as providing improved bus service. Commuter Services is one program sponsored by the MTC to meet the area's transportation needs.

Ridesharing programs are not new. They have individually proven themselves in a number of situations. Each of the Commuter Service program elements--carpool, vanpool, custom bus service and regular bus service--has been separately developed and offered by large employers and public agencies. Where these programs are all operational, ride-sharing has increased from 10 to 15 percent of all work trips to 25 to 30 percent in some instances.

Commuter Services was developed in response to several issues:

Many companies, for a variety of reasons such as lack of size or resources, have not been able to develop ridesharing programs.

Individual commuters who want to ride or share the driving have had nowhere to turn for assistance or information. If they worked for medium to small employers, there was insufficient scale to obtain matches at the residential end among fellow employees.

Efforts to implement ridesharing have been fragmented and uncoordinated.

There has been no mechanism or system to arrange for service delivery particularly for employees in multiemployer areas where large numbers of people are working in close proximity for different employers.

There has been no means to provide continuing support and administration after a program has been established.

Several institutional problems such as regulation, insurance, financing, etc. have limited broadly-based ridesharing programs.

There has been a lack of information on key implementation steps such as marketing research data, marketing communication approaches, use of third party service providers, etc.

Commuter Services is structured to address the above issues. It is a demonstration to test a number of operational elements. The following sections outline a description of the project operational plan, project objectives, project organization and responsibilities, and the project funding level and schedule.

## 1.2 DESCRIPTION OF DEMONSTRATION

The Commuter Services demonstration is a comprehensive program offering four different transportation modes to persons commuting to and from three selected employment locations where several employers are in close proximity. The services being promoted are: carpooling, vanpooling, custom bus and regular bus service. The Metropolitan Transit Commission (MTC) has overall responsibility of coordinating the ridesharing brokerage.

The program will be marketed through participating employers to their employees, working initially with the largest employers to gain scale for initial matching, then to smaller employers to reach all commuters to a site. The marketing strategy is to make personal calls to each of the largest employers, while using an audiovisual presentation for groups of smaller employers and business groups.

The initial request to the employer will be to sponser the program, appoint a coordinator and conduct a travel survey. Following analysis of the travel data, service potentials will be ascertained and marketing to employees will commence. The marketing to employees will be by group presentation.

The actual delivery of services other than carpooling will be by contract with a third party provider (for vanpooling) or bus operator (for custom bus service). These contracts will provide for the payment of the difference between the initial operating revenues and expenses although the program is designed to become self-sustaining. Carpooling brokerage services and continuing marketing services, will be by an Area Office of the MTC located at one of the demonstration sites. This Area Office actually will be initially organized by PSO which will perform the start-up marketing, structure the service delievery system and perform other start-up and evaluation tasks.

1.2.1 Ridesharing Modes

Each of the ridesharing modes being promoted have different operating economies and characteristics. As a result, one of the important functions of the brokerage service is to tailor the appropriate ridesharing service to the specific needs of commuters. The four ridesharing modes involved in this demonstration are described below.

1.2.1.1 Carpooling--Carpooling is now, and is likely to be the largest form of ridesharing. For example, in 1970, almost twice as many commuters in the Twin Cities area were passengers in automobiles (15%) as rode on buses (8%).

The advantages of carpooling are its flexibility, relative ease of formation and operating economies even at relatively shore commute distances.

The basic approach to promoting carpooling is to market the service to employees, build a file of interested poolers, monitor pooling activity and organize a quick response system to form new pools, add to existing pools and reform pools that break up. For the purposes of this demonstration, the carpool emphasis will be on three or more persons riding together, although it is expected that two person carpools may be formed as a result of the brokerage efforts.*

The matching process will begin following the marketing effort with a person submitting an application for carpooling. The intent is to register all carpools in operation as well as those persons who do not currently pool but desire to do so.

The heaviest data processing work load will occur in the early stages of program implementation. The applications will be manually processed to establish a file of persons who carpool or express an interest in carpooling at a particular site. The MTC Area Office will manage the data base system and forward the list of potential matches to the appropriate employer coordinator. The Area Office and company coordinator will then set up an organizational meeting so that those persons who were matched can meet each other and form their pool. Administrative arrangements for the carpools (e.g. payment method, if any; schedule of driving responsibilities, etc.) will be left up to the individuals involved.

After the initial matches, there will be a need to form pools to replace those which have terminated and to match new applications. The applications will be received by the Area Office either in written form or by

* For example, selected employers may offer parking incentives (e.g. close-in reserved spaces) and these incentives will be restricted to vehicles with three or more occupants.

phone. The request will first be manually matched if possible, and also entered into the computer file. The Area Office will phone the persons who are matched to arrange the pool.

1.2.1.2. Vanpooling - Vanpooling is a program where a 12-15 passenger van is supplied to a group of 10 or more interested persons for commuting. One of the commuters volunteers as the primary driver to pick up riders at or near their homes and drive them to and from work. Each passenger pays a monthly fare in advance. The fare is based on distance travelled. The volunteer driver has a free work trip, free personal use of the van for the first 250 miles per month and may share in the fare income above the minimum number of riders.

Marketing of the vanpool service is being handled in much the same manner as the carpool service as described above. Vanpool operations are being handled by a third party provider (VSI) under contract to MTC. The third party provider is responsible for all elements of vanpooling including marketing of services, matching potential riders, delivery of vans, insurance, maintenance and driver selection and training.

The vanpooling program will be periodically marketed and promoted. Vanpool formation after the initial marketing effort will be generated by:

Persons who could not be initially served
Waiting lists
New employees
Interest generated by existing riders and drivers
Car pools
Phone calls from employees

1.2.1.3. Custom Bus--Custom Bus is a service where a bus is operated for a group of 35 or more persons. The route is tailored to the convenience of a specific group of riders and modified as necessary to reflect

rider needs. While the basic route policy will be to provide door-to-door service, park and ride or common collection points may also be established. In the latter case, line-haul times will be competitive with private auto.

Fares will be paid on a monthly subscription basis to cover the full contract price of the bus. One of the commuters will be selected as a bus-pool coordinator. This person will coordinate with the driver and the Area Office relative to ridership levels, route selection, and rider satisfaction. This person will ride free.

Service will be structured for 35 or more persons. The service policy is that minimum ridership levels must be maintained in order to continue service. When ridership falls below 35, subscribers will be notified that service will be discontinued in 90 days unless the number of subscribers increases to the minimum level or existing riders agree to increased fares equivalent to 35 riders.

Service will be delivered by the bus operator who has operating rights in the residential pick up area (MTC or a private operator, depending on the area). The operator will supply a standard, air-conditioned transit bus. The same will be assigned each day.

1.2.1.4. Existing Transit-- Regularly scheduled bus service exists at each of the selected demonstration sites. Commuter Services has identified existing routes at each site and promotional material (e.g., maps, schedules) will be distributed to employees along with information on other ridesharing modes. The Area Office will also work with the MTC Transit Operating Division to revise existing service and/or develop new services if the demand seems to warrant it.

### 1.2.2 Demonstration Sites

A major innovation of this demonstration is its choice of multi-employer sites as the focus of the marketing and brokerage efforts. Multi-employer sites effectively increase the size of a potential pool of ride-sharers with a common destination. Yet to be practical, the employers within a given site must be in close proximity and have relatively easy access between buildings.

Seven specific criteria were established for selecting candidate multi-employer sites in the Twin Cities Area.* To be considered, a site had to have:

2000 or more employees
an area with no more than a one-half mile radius
a suitable roadway network
two or more employers of 250 or more
employer interest in program participation
suitable employment characteristics (e.g., minimal split shifts).

Ten sites were initially chosen that satisfied most of the criteria. Further analysis resulted in eliminating seven locations from further consideration. Sites were eliminated if they were solely retail, if employee turnover was high, or if too many employees had part-time, seasonal, rotating, or night shifts.

The three sites selected are South Central Minneapolis, Pentagon Park/Normandale, and Central Bloomington. Figure 1.1 shows the location, employment size and driving distance from the CBD of each of the three sites.** For reference, the CBD area is also shown in Figure 1.1.

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*Note that the Central Business Districts of Minneapolis and St. Paul were excluded from consideration. The demonstration is specifically oriented toward promoting ridesharing at non-CBD work places.

**The numbers shown in the figure represent the site employment (left of the slash) and driving distance to the CBD.

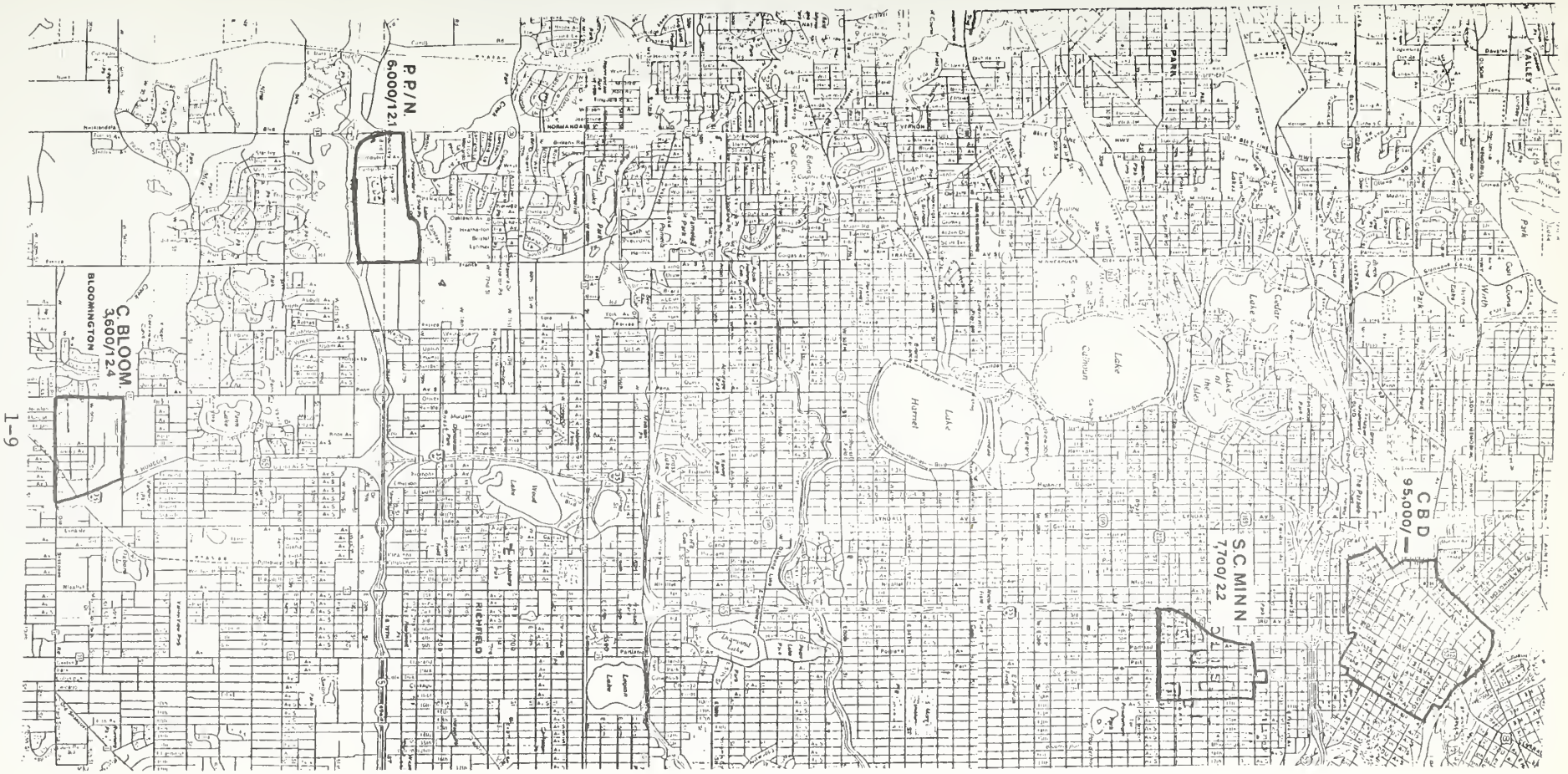


FIGURE 1.1 LOCATION OF DEMONSTRATION SITES

1.2.2.1. South Central Minneapolis - This area from I-35W to Elliot Avenue, and from 24th Street south to Lake Street, has about 7700 employees. Significant employers include Honeywell, Sears, Northwestern Hospital, Children's Health Center, Mt. Sinai Hospital, and Sister Kenney Institute. There is also significant office employment along Park and Portland Avenues.

There are some natural advantages for ride sharing in the area. All locations experience congestion and some lack adequate parking. Honeywell is expanding its headquarters location and also has experience in vanpooling. Circulation between employers is generally good although a one-way street pattern may result in some circuity. While the Distance between Chicago Avenue (Sears) and 4th Avenue (Honeywell) is not excessive, access may be time-consuming when streets are congested.

There are two negative (from a ridesharing perspective) employment situations in the area. The first of these is the hospitals where a three-shift, seven day per week, 365 day per year situation exists with the further complication that nursing personnel work rotating shifts and rotate among shifts. The second is that Sears has a strong seasonal employment pattern and large numbers of part-time personnel. It was nonetheless felt that sufficient stable employment existed in the area to make this site a viable candidate.

The total employment of Honeywell, Sears, Children's Health Center, Mt. Sinai Hospital and Northwestern Hospital, the largest of the site's employers, is 4,915. The 1,578 difference between total employment and the 3,337 with regular hours are rotating shift personnel or persons starting at other hours. Adding 1,000 for other employers not yet contacted gives a solid core of 4,000 commuters with approximately the same working hours.

Interest was expressed by all key employers in cooperating with Commuter Services, although there is little flexibility in adjusting work hours.

1.2.2.2. Pentagon Park/Normandale - This is a general office and manufacturing center with approximately 6,000 employees. The site straddles the towns of Bloomington and Edina and is bounded by I-494, Highway 100, 75th Street, and France Avenue.

There are 44 employers of more than 25 persons. Six employers have more than 150 employees each. The largest employer is Control Data Corporation - Magnetic Peripherals which accounts for nearly 2,000 employees in one plant. The other large employers are Data Card, ADC, National Computer Systems, General Mills Chemical, Home Insurance, and INA Insurance. In total, the area has over 330 firms. A number of these are involved in sales or service activities which may limit the number of pooling candidates.*

Working hours at the Pentagon Park/Normandale site tend to be split into two sets: 7 AM - 3:30 PM for production workers, and 8 AM - 4:30 PM for office workers. The apparently wide distribution of working hours which limits the size of poolable groups may be less of a problem than it appears due to the willingness of some employers to permit adjustments in working hours.

Local street circulation around this site is relatively congested during peak hours as there are only two arterial entrances serving this area from Highway 100 or France Avenue. Parking, however, is generally adequate.

Many large employers expressed considerable interest in participating in Commuter Services as a way of alleviating local street congestion, increasing access to a larger labor market or improving their possibility of expanding at

*Because personnel in these firms have varying work hours, require their car for work and often do not report to their sales office for several days.

their present site without adding much additional parking. CDC has already set up a vanpool program for their employees. At its peak, CDC was operating five vans. Currently, only two vans are still in service.

1.2.2.3. Central Bloomington West of I-35W - This center has a number of manufacturing companies as well as a mixture of general office, warehouse and distribution and sales offices. It is bounded by I-35 W, Penn Avenue, 92nd Street and Old Shakopee Road. There are 28 employers of 25 or more, six employers of 160 or more, and a total employment of approximately 3,600. There is good access to the center and adequate parking. Employers are located relatively conveniently to one another with good circulation between them.

The largest employer, Donaldson Company, has flexible working hours. Some of the other employers have indicated a willingness to adjust their working hours. Most large employers at the site have expressed significant interest in participating in the Commuter Services program.

## 1.3 OBJECTIVES OF DEMONSTRATION

This demonstration project directly addresses the SMD program goals of increasing vehicle productivity and increasing transit coverage. The overall project objective is to develop and implement a coordinated and comprehensive ridesharing program in order to reduce heavy reliance on single occupant automobile commuting. The demonstration will test the feasibility of using a *transportation broker* to promote and coordinate a *variety of commuter services* for employees at *multi-employer work sites*.

It is hoped that there will be active participation from 80 percent of the employers within the demonstration areas. The primary local objective is

to achieve an overall ridesharing level of 30 percent of all person trips to each demonstration site within one year of project implementation.

Key issues of interest to local project staff include evaluating the cost/benefit impact of the project, assessing the effectiveness of the services provided, ascertaining the managerial requirements of the Area Office, and the feasibility of expanding the brokerage service to other multi-employer work sites in the Twin Cities metropolitan area.

## 1.4 HISTORY AND STATUS

### 1.4.1. Previous Ridesharing Promotion Efforts in Twin Cities Area

Prior to the start of the Commuter Services demonstration, ridesharing-promotion efforts in the Twin Cities area were successful in isolated instances, but were largely the result of uncoordinated private initiatives. Several employers in the Twin Cities area have long supported efforts to promote carpooling. The area is a national leader in employer-based vanpooling programs. Led by the 3M company currently operating 86 vans, it is estimated that there are now over 130 vans carrying approximately 1400 commuters in the metropolitan area.

The first organized effort to bring carpooling to the attention to employers throughout the area began in 1973 when the Highway Department made a matching program available to employers. The Minneapolis American Auto Association prepared a promotional packet and hosted a meeting for representatives of business and industry. Over 150 employers of 500 or more employees attended the meeting.

The largest single effort to promote carpooling occurred in a 1974 campaign sponsored by the Governor's office, the Highway Department and the Emergency Energy Committee. Carpool request forms went to three-fourths of a million homes with their telephone bills. An advertising campaign followed with radio and TV announcements and full page ads in the daily and weekly papers.

Another approach to attracting persons to ridesharing was conducted by the Minnesota Highway Department as a follow-up to the I-35W metering and preferential access demonstration in 1975. On 35W, it was noted that 60% of the traffic crossing a congested bridge over the Minnesota River did not go north of County Road 62 into Minneapolis. To reduce congestion on the route, steps were taken to encourage drivers of single occupant autos to carpool by identifying them and providing them with names of persons similarly entering the freeway in Burnsville south of the river and exiting in Bloomington north of the river. License plates were matched for entrance and exit, the names of owners obtained, and notice given to them of other drivers who presumably lived and worked close by.

### 1.4.2. Legislative Initiatives

The current demonstration project follows a series of promotional efforts sponsored by both private and State government organizations. Policy support for ridesharing programs exists in a number of Federal, state, and local policy statements. At the national level, the Federal Highway Act of 1976 broadened support of carpool and vanpool activities established earlier by the 1974 Emergency Highway Energy Act. The Federal Energy Administration (now part of the Department of Energy)

has supported the concept by including ridesharing as an integral part of statewide energy planning.

Local policy support for ridesharing programs has been provided by the Minnesota Legislature, the Governor's Office, the Minnesota Energy Agency, the Minnesota Pollution Control Agency, the Minnesota Highway Department, the Metropolitan Council, and the Minneapolis and St. Paul Chambers of Commerce. The Minnesota Legislature has charged MTC with ridesharing responsibility:*

> The MTC shall promote the use of carpools and employer vans in the Metropolitan area. The Commission's goal shall be to provide employers and employees with incentives to achieve by January 1, 1980, in the Metropolitan Area between 6:00 a.m. and 9:00 a.m. an increase in the proportion of persons riding rather than driving. . . to 50 percent.

Another local legislative initiative affecting this demonstration came in 1976, when the Minnesota Legislature (chapter 233) exempted commuter vans from Public Service Commission regulation and modified the regulatory, insurance, liability, and tax structures to facilitate van operation. This clarification paved the way for future van programs.

### 1.4.3. Current Status and Preliminary Findings

Phase I of this SMD project (completed in April, 1977) took the ridesharing concept, defined and packaged the services, designed an operational program, and studied the problems which hinder implementation. The activities performed by Public Service Options under contract to MTC included an economic analysis of carpooling, buspooling, and vanpooling services, a legal analysis of institutional issues related to models of multi-employer vanpooling, and market research to ascertain the attitudes

*Section 473.421 of the MTC law.

of existing and potential users of vanpool services.

Phase II, begun in July, 1977 involves the actual marketing and establishment of ridesharing services. Employers have been contacted at two of the three sites to determine their interest and secure their cooperation in marketing to employees. Responses have varied; typically there has been enthusiastic cooperation from employers of more than 100 persons but only limited early cooperation from smaller businesses, particularly those with fewer than 20 employees.

As of early December, employee marketing had been completed at one large company (CDC) at the Pentagon Park site. A series of forty minute presentations utilizing an eight minute audio-visual introduction was made to employee groups ranging in size from 20 to 60. About eighty percent of CDC's employees attended the session and of those, nearly sixty percent indicated an interest in one or more of the ridesharing services. Nearly as many employees expressed an interest in vanpooling as in carpooling. The employee applications are cuurently being processed for potential matches.

Employee marketing at two other large companies (Honeywell and Sears) has been scheduled for December and employer and employee marketing at smaller firms will follow through the rest of the winter.

Preliminary data on pre-implementation work trip travel patterns have been collected. In September and October 1977, travel surveys (see Figure 1.2) were distributed to employees of the three largest firms in the selected sites (Sears and Honeywell in South Central Minneapolis and CDC-Magnetic Peripherals in Pentagon Park/Normandale). The purpose of these surveys was to get an idea of the potential number of "poolable" employers, taking into account residential location, working days, and whether a car is needed for business purposes. The surveys also served to establish information on current mode choices for employees.

In order to overcome some of the problems associated with commuting to and from work, we want to know more about your commuting patterns and habits. Your answers to the following questions will help us do so; the data will be used for not other purpose. We ask that you fill out this questionnaire and return it to your supervisor as quickly as possible. Thank you. (PLEASE PRINT)

---

My name is: (8-23) Last Name (24-32) First Name (33) Middle Initial

My home address is: (34-39) Street Number (40-56) Street Name

(57-74) Name of City or Suburb (75-79) Zip Code (80) 1

---

I am employed by: _____
Name of Firm

My work telephone # is: (8-10) (11-14) My work starts at: (15-18) (nearest ¼ hour) (19-20) AM or PM (for example, 8:00 AM)

I normally work these days, not including overtime: (please mark X) (21-27) MO TU WE TH FR SA SU

My work ends at: (28-31) (nearest ¼ hour) (32-33) AM or PM (80) 2

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I work (mark X): (8) Full Time (9) Part Time (10) Seasonal

I work a rotating shift: (11) Yes (12) No

I usually work overtime: (13) Less than 1 day per week (14) 1-2 days per week (15) 3 or more days per week

I need a car for business: (16) Less than 1 day per week (17) 1-2 days per week (18) 3 or more days per week

I usually travel to and from work by: (mark X in only one)

(19) Drive Alone
(20) Carpool*-ride everyday
(21) Carpool*-drive everyday
(22) Carpool*-share driving with others
(23) Vanpool
(24) Dropped off by someone
(25) Bus
(26) Other-(walk, taxi, motorcycle, bicycle, etc.)

*Carpool is two or more people, including the driver.

My home telephone number is: (27-29) (30-33)

My employee mail station number is: (34-37) (38-41) (80) 3

THANK YOU

FIGURE 1.2 TRAVEL SURVEY

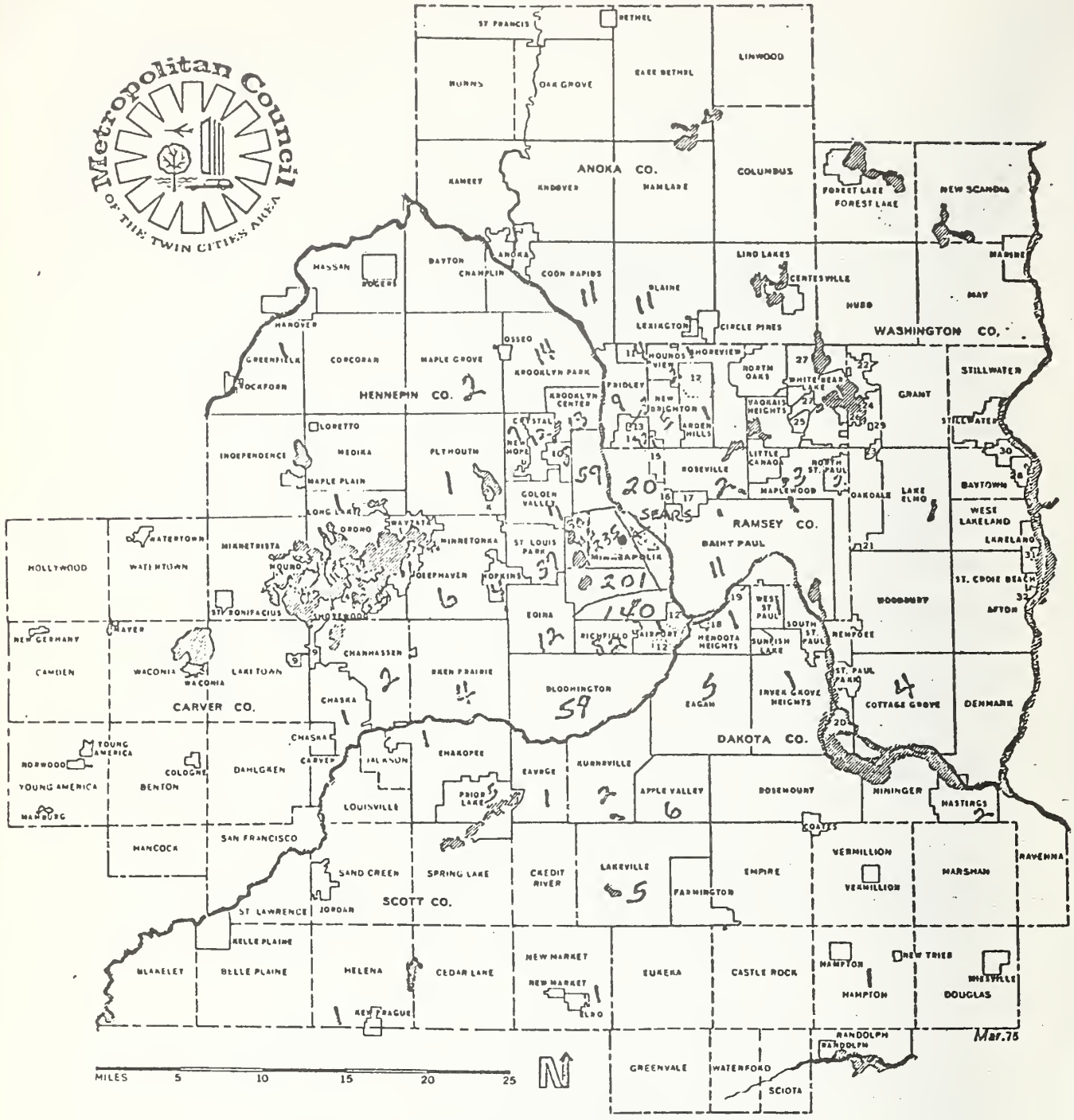
Eighty-two percent of those surveyed returned completed forms. The Minnesota Department of Transportation tabulated the results, using a revised version of a previously developed carpool matching computer program. The result from the preliminary surveys is summarized in Tables 1.1 and 1.2 and in Figures 1.3 to 1.5.

Ridesharing--defined here as workers who carpool, vanpool, take the bus, or are dropped off--currently accounts for between 28 and 48 percent of worker trips at the three companies surveyed. This variation is mostly due to differences in bus patronage. Nearly one fourth of Sears' employees arrive at work by bus, reflecting the relatively frequent bus service to Sears and that Sears employees' residences are heavily concentrated in the central city where transit coverage is good (see Figure 1.3). CDC by contrast--over 12 miles from the CBD--has only 2% bus patronage (but a higher carpool usage). Bus service to this site has limited coverage and frequency. Moreover, CDC employees' residences are much more dispersed than Sears employees (see Figure 1.5).

Table 1.2 gives an indication of the extent to which overtime work shifts or required business use of a car inhibits carpool formation. First of all, it can be seen that the requirement for working overtime varies significantly by type of business. At Sears, which is both a retail outlet and catalog store, only five percent of the catalog workers reported working overtime shifts. Honeywell's corporate offices had a much higher (15%) incidence of employee overtime. And at CDC, whose staff is divided between production workers and an engineering division, fully one-third

TABLE 1.1 PRE-IMPLEMENTATION WORK TRIP MODE SPLIT
AT SELECTED LARGE FIRMS
(Figures are in percent of person-trips)

| Work Trip Mode | South Central Minneapolis | | Pentagon Park/ Normandale |
|---|---|---|---|
| | Sears | Honeywell | CDC |
| Carpooling | 15 | 17 | 22 |
| Vanpooling | 0 | 0.2 | 1 |
| Dropped off | 10 | 3 | 3 |
| Bus | 23 | 8 | 2 |
| Subtotal Ridesharing | 48 | 28.2 | 28 |
| Drive alone | 40 | 69 | 71 |
| Other | 6 | 2 | 1 |
| Total No. of Survey Returns | 1,244 | 1,711 | 1,723 |




# TWIN CITIES METROPOLITAN AREA
# Political Boundaries, 1975

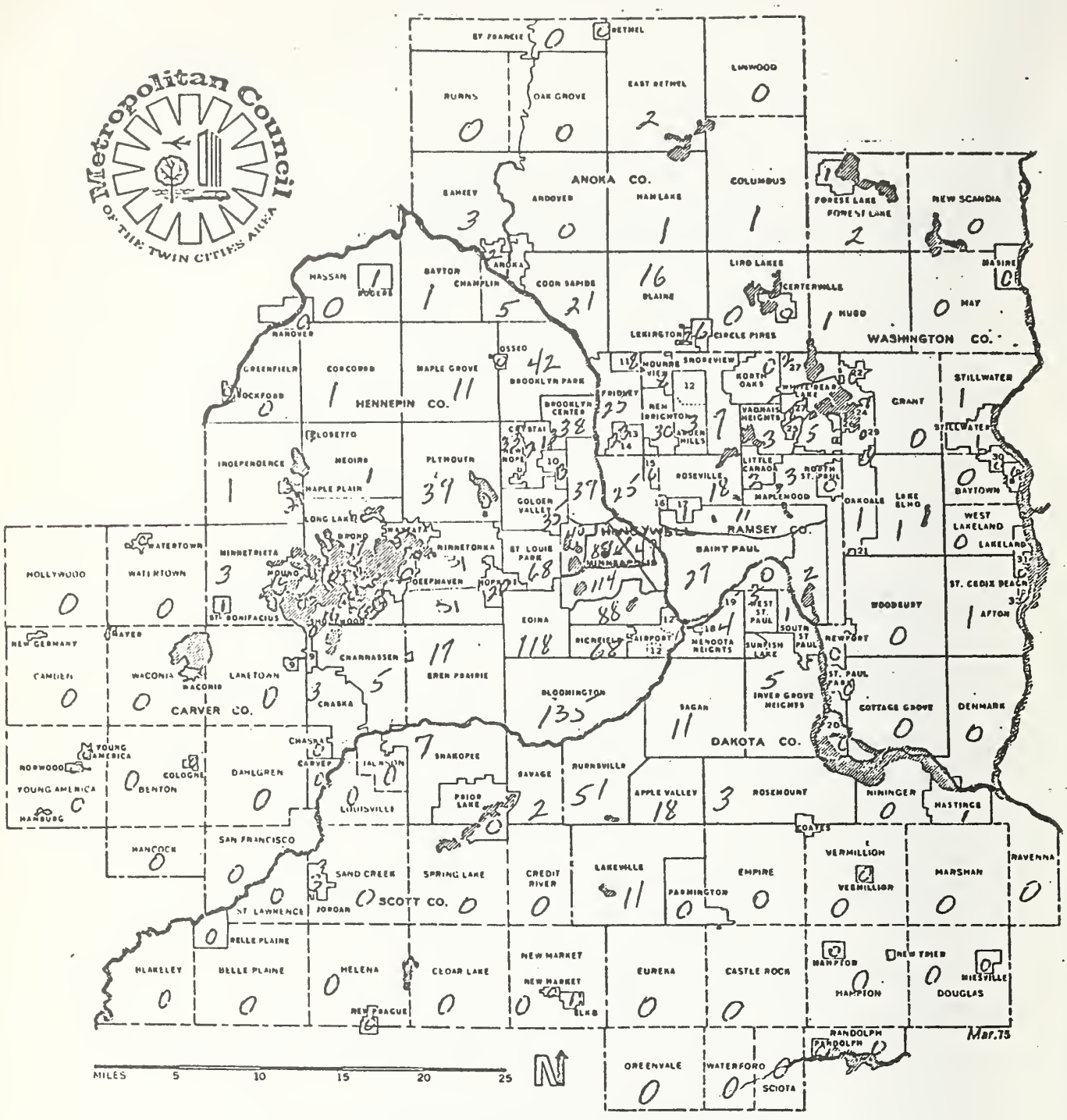
1 SPRING PARK
2 ORONO
3 MINNETONKA BEACH
4 TONKA BAY
5 EXCELSIOR
6 GREENWOOD
7 WOODLAND
8 MEDICINE LAKE
9 VICTORIA
10 ROBBINSDALE
11 SPRING LAKE PARK
12 U E CONT
13 HILLTOP
14 COLUMBIA HEIGHTS
15 ST ANTHONY
16 LAUDERDALE
17 FALCON HEIGHTS
18 MENDOTA
19 LILYDALE
20 GREY CLOUD
21 LANDFALL
22 OELLWOOD
23 PINE SPRINGS
24 MAHTOMEDI
25 GEM LAKE
26 BIRCHWOOD
27 WHITE BEAR
28 BAYPORT
29 WILLERNIE
30 OAK PARK HEIGHTS
31 LAKELAND SHORES
32 ST MARY'S POINT

ANOKA — County Boundary
ORONO — Municipal Boundary
CAMDEN — Township Boundary

FIGURE 1.3 DISTRIBUTION OF SEARS EMPLOYEES' RESIDENTIAL LOCATION

TABLE 1.2 WORK CONDITIONS WHICH MAY INHIBIT RIDESHARING FORMATION
(Figures are in percent of workers who returned travel survey)

| Work Condition | South Central Minneapolis | | Pentagon Park/ Normandale |
|---|---|---|---|
| | Sears | Honeywell | CDC |
| Work o.t. 1-2 days/wk. | 4 | 17 | 15 |
| Of these, % who carpool | 10 | 12 | 20 |
| Work o.t. $\geq$ 3 days/wk. | 2 | 10 | 18 |
| Of these, % who carpool | 0 | 5 | 16 |
| Total o.t. | 5 | 27 | 33 |
| Of these, % who carpool | 7 | 9 | 18 |
| Need car 1-2 days/wk. | 5 | 19 | 15 |
| Of these, % who carpool | 23 | 15 | 19 |
| Need car $\geq$ 3 days/wk. | 22 | 11 | 17 |
| Of these, % who carpool | 16 | 9 | 16 |
| Total needing car | 25 | 30 | 33 |
| Of these, % who carpool | 17 | 13 | 17 |
| Total No. of Employees | 1,447 | 2,000 | 2,240 |
| Total No. of Survey Returns | 1,244 | 1,711 | 1,723 |
| Percent Returned | 86 | 86 | 77 |




# TWIN CITIES METROPOLITAN AREA
# Political Boundaries, 1975

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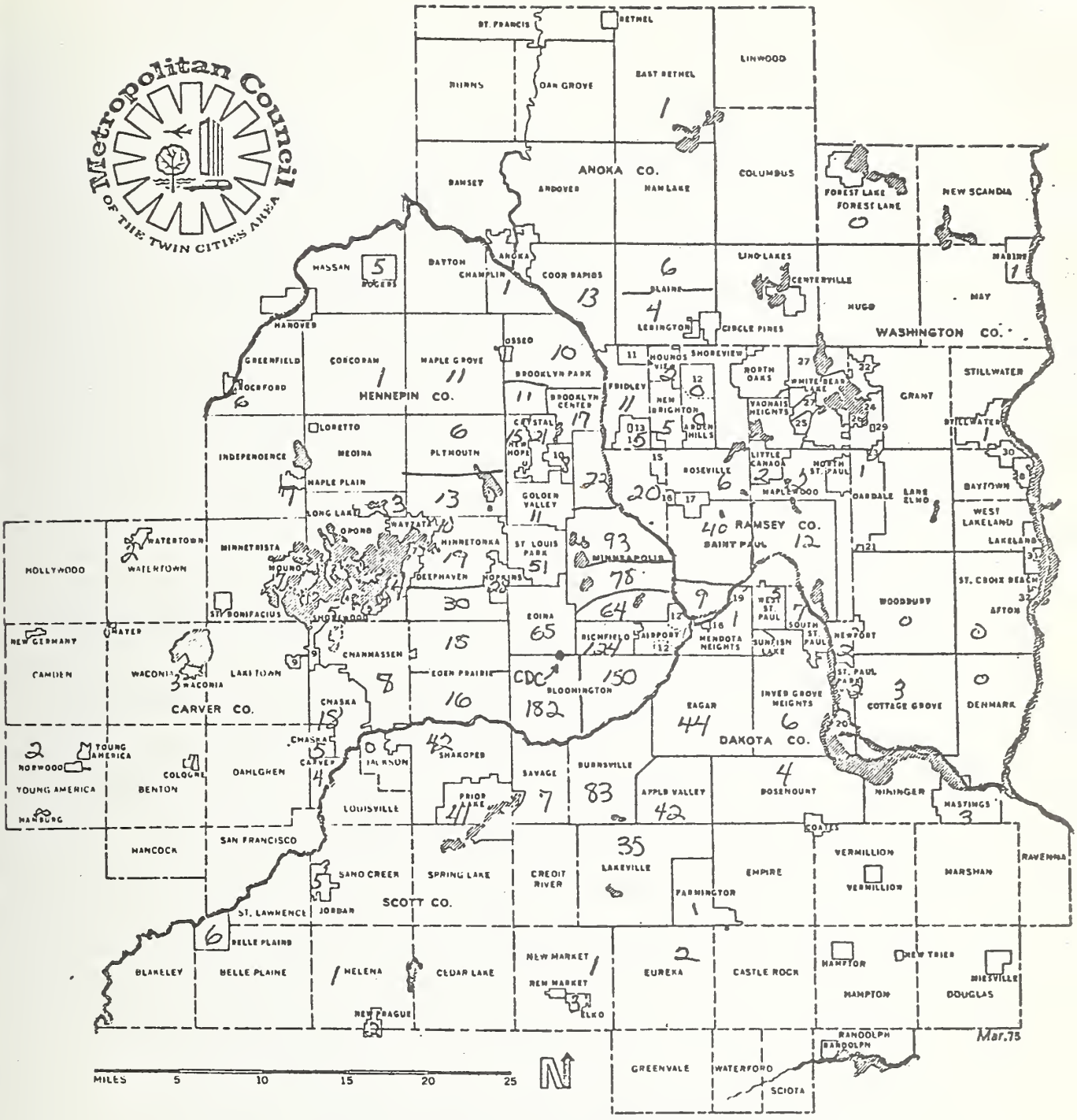
5 EXCELSIOR
6 GREENWOOD
7 WOODLAND
8 MEDICINE LAKE
9 VICTORIA
10 ROBBINSDALE
11 SPRING LAKE PARK
12 U. S. GOVT.
13 HILLTOP
14 COLUMBIA HEIGHTS
15 ST. ANTHONY
16 LAUDERDALE
17 FALCON HEIGHTS
18 MENDOTA
19 LILYDALE
20 GREY CLOUD
21 LANDFALL
22 OELLWOOD
23 PINE SPRINGS
24 MAHTOMEDI
25 GEM LAKE
26 BIRCHWOOD
27 WHITE BEAR
28 BAYPORT
29 WILLERNIE
30 OAK PARK HEIGHTS
31 LAKELAND SHORES
32 ST. MARY'S POINT

ANOKA — County Boundary
ORONO — Municipal Boundary
CAMDEN — Township Boundary

FIGURE 1.4 DISTRIBUTION OF HONEYWELL EMPLOYEES' RESIDENTIAL LOCATION




# TWIN CITIES METROPOLITAN AREA
# Political Boundaries, 1975

1 SPRING PARK
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10 ROBBINSDALE
11 SPRING LAKE PARK
12 U S GOVT
13 HILLTOP
14 COLUMBIA HEIGHTS
15 ST. ANTHONY
16 LAUDERDALE
17 FALCON HEIGHTS
18 MENDOTA
19 LILYDALE
20 GREY CLOUD
21 LANDFALL
22 OELLWOOD
23 PINE SPRINGS
24 MAHTOMEDI
25 GEM LAKE
26 BIRCHWOOD
27 WHITE BEAR
28 BATPORT
29 WILLERNIE
30 OAK PARK HEIGHTS
31 LAKELAND SHORES
32 ST. MARY'S POINT

ANOKA — County Boundary
ORONO — Municipal Boundary
CAMDEN — Township Boundary

FIGURE 1.5 DISTRIBUTION OF CDC EMPLOYEES' RESIDENTIAL LOCATION

of all employees reported working overtime at least one day per week.

Not surprisingly, carpool usage for workers reporting frequent overtime shifts is lower than the company wide average. However, there appears to be a distinction between the travel patterns of those who work one or two overtime days per week at most and those who work overtime more frequently. As can be seen from Table 1.2, the incidence of relatively infrequent overtime workers who carpool is only *slightly* lower than the company wide average. Contrastingly, no workers at Sears who frequently work overtime carpool to work (compared to 15% of all Sears employees who carpool). The corresponding carpool mode splits at Honeywell and CDC for frequent overtime workers are 5% and 16% respectively, significantly below overall company averages.

The implication here is that the need for employees to work overtime infrequently does not appear to hinder significantly ridesharing formation. It should be stressed, however, that this finding is based on examining carpooling patterns which are largely intra-company where overtime shifts are apt to be the same for all members of a carpool. At multi-employer sites, forming carpools among members from different companies may be difficult in the face of overtime shifts for any or all participants.

The results in Table 1.2 also suggest that employees who require their car for business during the day are not significantly inhibited from forming carpools. This is particularly true for those who require a car during the day no more than two days per week. Carpooling rates for these employees are only slightly lower than for their company as a whole. These results are encouraging in that they suggest that ridesharing arrangements may be made flexible to accomodate commuters' special work requirements.

## 1.5 ORGANIZATIONAL ROLES

The overall management, direction, and coordination of the demonstration is the responsibility of the Metropolitan Transit Commission. The SMD contract is being administered by MTC's Transit Development Division. This program is designed to be a continuing activity, starting with the demonstration and expanding to new sites beyond the demonstration. The intent is to build up a permanent management capability within the MTC to manage this and other projects.

A Project Advisory Board has been set up comprised to representatives of the sponsoring public agencies and supportive organizations. The Board will review, advise on, and assist in coordination for the duration of the demonstration phase. Members will include representatives solicited from:

The Minnesota Department of Transportation

Hennepin County

Metropolitan Council

Transportation Advisory Board

Municipalities containing the demonstration sites

Business Associations.

The MTC has provided internal staff for an Area Office located at the Pentagon Park Site. The Area Office will coordinate the various ridesharing programs, have primary responsibility for marching carpool riders, market to small businesses, maintain a liaison with the MTC Transit Operating Division, and will manage day-to-day operations of the demonstration after the start up phase.

Public Service Options (PSO), a private firm under contract to MTC, was instrumental in developing the initial design of the demonstration in Phase I. They are currently responsible for day-to-day management and operations of the project in its start-up phase, for continuing to refine the operational details of the project, for marketing to large employers and for assisting in analyzing and monitoring project impacts. responsibility is Vanpool Services Inc., a subsidiary of Chrysler Corporation. VSI, under contract to MTC, is in charge of all aspects of the vanpool program including marketing, initial matching, van provision, maintenance, and insurance, and driver selection and training. They collect all fees for the service directly from the van driver/coordinators and are responsible for helping to maintain van occupancy at a minimum of nine passengers.

Carmichael-Lynch Inc., a marketing consultant, has been retained by MTC to design, develop, and produce promotional materials including an audio visual presentation.

Data processing for travel survey data analysis and rideshare matching will be the responsibility of the Minnesota Department of Transportation.

Local advisory functions will be fulfilled by two boards. The Employer Advisory Board will be composed of Commuter Services Coordinators from each participating employer and will serve as an information dissemination mechanism and advisor on program effectiveness. The Commuter Advisory Board will be selected from ridesharing participants at the sites and will advise MTC on service quality and effectiveness.

The Transportation Systems Center (TSC) has responsibility for monitoring the implementation and evaluation process. TSC will provide technical supervision of Cambridge Systematics, Inc. (CSI), the evaluation contractor. The evaluation of the project requires an effective integration of TSC's, CSI's, and MTC's and PSO's roles throughout the demonstration. Basic responsibilities of CSI include:

- developing specifications for necessary data to be collected;
- developing a schedule of evaluation tasks and collection efforts;
- reviewing and monitoring data collection efforts for conformance to the Evaluation Plan;
- designing and performing the data analyses; and
- developing interim and final evaluation reports assessing the project's implementation, operation, and impacts.

In assisting the evaluation contractor, MTC is responsible for providing much of the information and data necessary to perform the evaluation. In addition to providing all operating procedures and documents (e.g., progress reports, operating procedures and documents, etc.), this includes acting as a data collection coordinator/clearinghouse to:

- keep TSC and CSI informed of demonstration plans and activities;
- provide a chronology of project events;
- provide data and information on demonstration operations;
- obtain additional data if not otherwise available; and
- transmit data in a format agreed upon with SCI.

The organizational roles of the agencies involved in this demonstration is summarized in Figure 1.6.

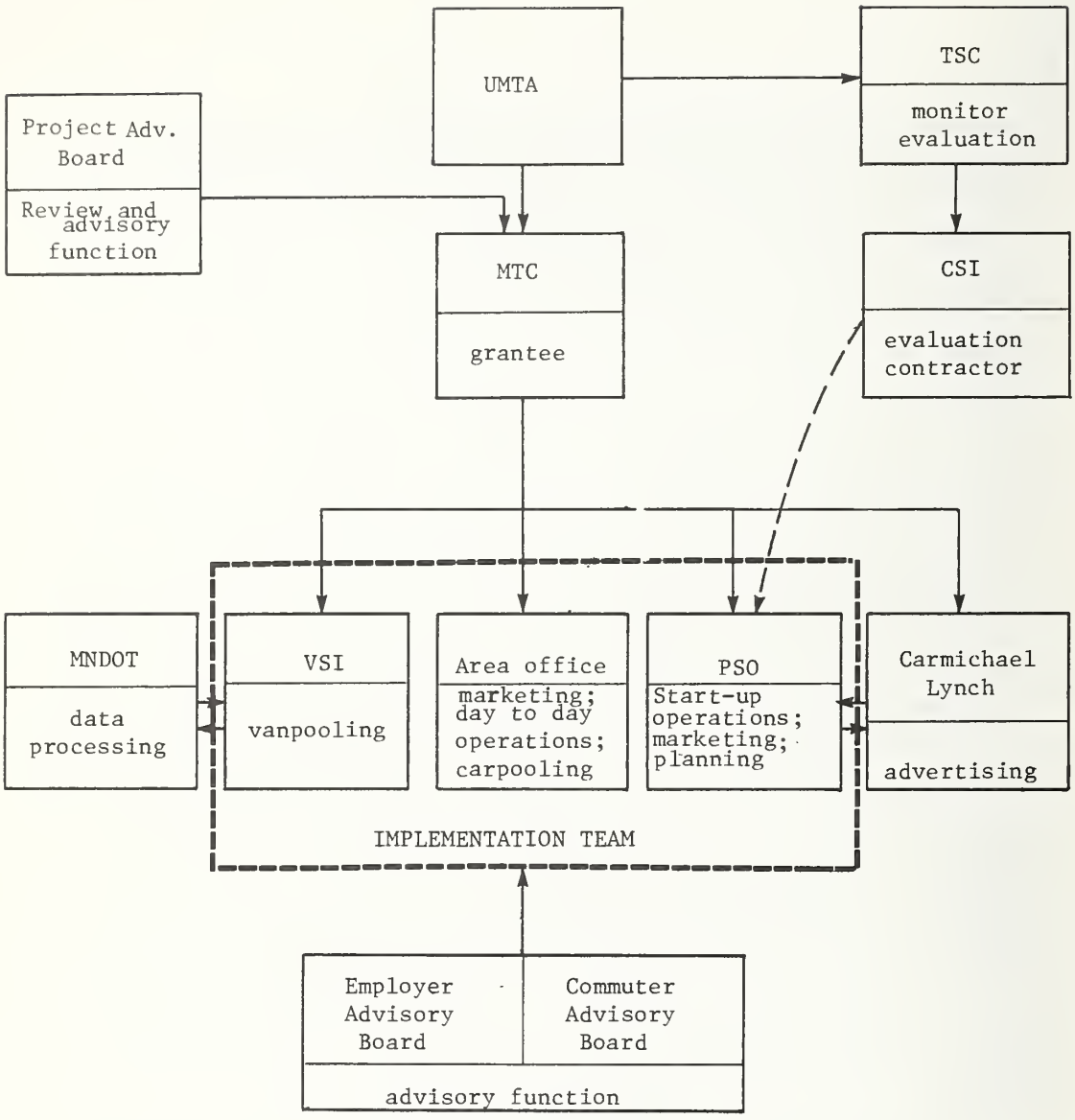



FIGURE 1.6 ORGANIZATIONAL ROLES

## 1.6 PROJECT FUNDING AND SCHEDULE

MTC has two major sources of funding for this demonstration: a two-year $335,000 UMTA Section 6 grant that started in June, 1977 and a three-year $560,000 Federal Aid Urban authorization as of July, 1977. The bulk of the early marketing and other setup activities are being funded from the UMTA grant. As the demonstration moves into its operational phase, the majority of the funding will come from the FAU grant.

MTC has contracted the services of three consulting agencies as noted below.

| Organization | Contract Amount | Contract Period |
|---|---|---|
| Public Service Options | $165,000 | 6/77 - 6/78 |
| Carmichael-Lynch | 40,000 | 7/77 - 7/78 |
| Vanpool Services | 83,600 | 10/77 - 10/79 |

Figure 1.7 summarizes the schedule of project activities. Although the project is funded as a *demonstration* for two years, it is the intention of MTC to provide brokerage service as a continuing activity and, in fact, to expand the program, if successful, to other multi-employer sites.

## 1.7 EVALUATION OVERVIEW

The evaluation of the Minneapolis Ridesharing Commuter Services Demonstration will have three major elements: process descriptions, statistical analyses of performance measures, and work trip mode choice modelling. *Process descriptions* are intended to provide a qualitative record of how each of the Commuter Service functions and modal services is managed and operated. Of particular importance here is documenting the marketing strategies employed, the legal and institutional barriers encountered

| | |
|---|---|
| June, 1977 - August, 1977 | Project Mobilization and Organization |
| July, 1977 - December, 1977 | Initial Employer Marketing |
| | Service Structuring |
| | Market Awareness Campaign |
| November, 1977 - February, 1978 | Initial Marketing to Employees of Large Employers |
| December, 1977 - continuing | Commencement of Actual Service Delivery |
| | Follow-up Marketing to Employees of Smaller Employers |
| February, 1978 - continuing | Service Expansion at Demonstration Sites |
| April, 1978 - continuing | MTC Evaluation |
| May, 1978 - continuing | Expansion of Program to Additional Areas |

FIGURE 1.7 REVISED DEMONSTRATION SCHEDULE

(and how these problems were resolved), and a chronological presentation of the administrative framework for organizing a ridesharing brokerage at multi-employer centers. The process descriptions will be oriented towards agencies that may be contemplating a ridesharing brokerage and hope to gain from the Minneapolis demonstration experience.

The second major element of the evaluation involves the collection and derivation of specific performance measures selected to identify the extent to which the project meets its stated objectives. These evaluation measures, oriented around eleven key demonstration issues (see Section 2.2), are presented and discussed in Section 2.3. By and large, the evaluation measures are quantitative. In collecting and organizing the data, care will be given to ensure statistical and definitional consistency to facilitate "before-after" comparisons of ridership, productivities and other measures as well as to facilitate static comparisons across modal services.

While a careful analysis of the evaluation measures is important in ascertaining *what* impacts occurred, the third major evaluation element consists of disaggregate demand modelling to aid in an understanding of *why* ridership changes occurred. Fully understanding the demand responses is a complex task. Level of service changes brought about by the demonstration differentially affect commuters with differing socioeconomic profiles, commute distances, auto ownership levels and predispositions toward alternative modes. Modelling provides an approach to "untangle" the numerous explanatory factors behind observed changes. The proposed approaches are more fully discussed in Chapter 4.

The evaluation effort is anticipated to cover the period January,

1978 through June, 1979. UMTA demonstration funding is scheduled to end in April, 1979, and although other funding sources will maintain the project's initiatives, no further evaluation is envisioned. Over the course of the eighteen month evaluation, committment of project resources will be geared to demonstration progress at the three demonstration sites. Analyses will be equally devoted to the three multi-employer sites, as each provides a unique "data point" on project impact under specific conditions.

# 2. MAJOR DEMONSTRATION ISSUES AND ASSOCIATED MEASURES

## 2.1 DEMONSTRATION CONTEXT

The major objective of the Minneapolis ridesharing demonstration is to increase work trip vehicle occupancy at selected large employment sites. Key elements of the demonstration which differentiate it from previous ridesharing promotion efforts are the reliance on a transport broker to market, coordinate and monitor the program; the promotion of a range of ridesharing services including carpools, vanpools and bus; and the choice of multi-employer sites as the focus of the program.

While ultimately the effectiveness of the program will be measured by the resulting increase in commuting vehicle productivity, the focus of the evaluation must be devoted to analyzing the response to *specific marketing efforts* and assessing the extent to which targeting *multi-employer* sites is critical to program viability.

For the most part, the services being promoted in this demonstration are not new. From preliminary surveys administered at the three largest companies in the demonstration sites, it was found that carpooling currently accounts for as much as 22% of work trips (at CDC), bus for as much as 23% (at Sears), and that at least one area company (CDC) currently offers a vanpool service. Nonetheless, a substantial market for the promotion of ridesharing still exists. Single occupant auto is currently by far the predominant mode choice at all three demonstration sites (e.g., 71% of CDC workers drive alone), and even those commuters who presently carpool may be encouraged to add members to their pool or consolidate two or three carpools into a single van.

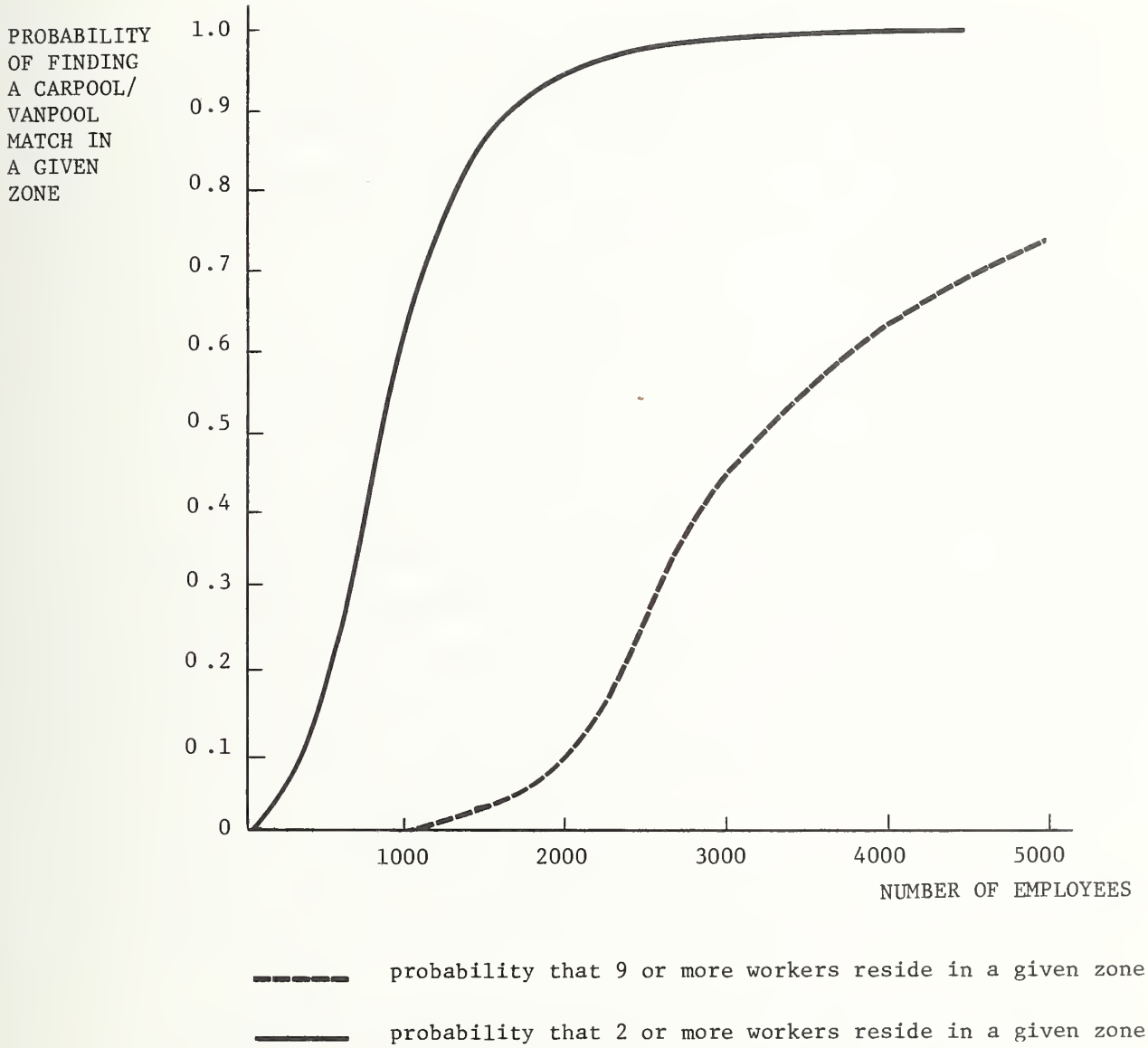
There are several key elements of the demonstration that will encourage an increase in work trip vehicle occupancy:

Increased Commuter Awareness: Promotion *per se* will increase commuter awareness of the potential cost savings of carpooling, vanpooling and bus commuting. Even if the demonstration did nothing other than advertise commuter alternatives via employee seminars, brochures, posters, etc., we could expect *some* increase in ridesharing activity. It should be stressed, however, that the experience in other cities suggests that promotion alone* is not effective in significantly increasing ridesharing levels (1, 2).

Active and Continuing Matching Assistance: Perhaps the most important function of the ridesharing broker is to provide matching assistance to interested commuters. By centralizing the processing of employee applications, the ridesharing broker can help commuters who might otherwise not be able to find a suitable match.

Coordination at Multi-Employer Sites: Coordinating the brokerage service at multi-employer sites significantly increases the number of poolable commuters sharing a common work location. For example, the Central Bloomington demonstration site has over 3,500 employees in an area less than three-fourths of a square mile, yet the largest single company employs less than 650 workers. The probability of finding carpool/vanpool matches depends critically on the number of potential ridesharers, as indicated in Figure 2.1. Moreover, with larger numbers of potential poolers, the collection/distribution distances between rider pickup points can be reduced.

*That is, relying on individuals to find suitable matches on their own.




Above curves assume that it is equally likely that a worker lives in any one of 500 residential zones

FIGURE 2.1 EFFECT OF SCALE ON LIKELIHOOD OF FINDING CARPOOL/VANPOOL MATCHES

New Services: While neither the concept nor the technology is new, to many commuters previously unaware of the benefits of ridesharing or unable to find a suitable pool to join, the demonstration will *effectively* offer new transport services. This is particularly true for the vanpooling and subscription bus promotion efforts and any changes in regular bus routes or schedules that come as a result of the demonstration.

Improved Level of Service: The most publicized benefit of ridesharing compared to driving alone is a reduction in commuting costs. These savings can be substantial; promotional material being distributed to employees at the demonstration sites advise commuters that carpooling can save them $425 per year and vanpooling $430 per year over the costs of driving alone.* The demonstration may further enhance the competitiveness of ridesharing modes by offering parking incentives (e.g., close-in reserved spaces) to qualified carpools and vanpools. This type of incentive has proved effective in other applications, particularly where parking spaces are scarce, inconvenient and/or expensive (3,4). Finally, by enlarging the pool of potential ridesharers, the demonstration should be able to match commuters living in relatively close proximity, thereby reducing collection/distribution times.

While all of the demonstration elements cited above should serve to stimulate ridesharing activity, they should be viewed against several offsetting factors which may discourage significant increases in work trip vehicle occupancy. First of all, none of the demonstration sites currently face a critical shortage of parking space, high parking cost or serious

*These figures are based on "typical" commuting conditions: a ten mile work trip in an intermediate-sized car. Carpool costs are based on a vehicle occupancy of three, and vanpool costs calculations assume 9 passengers.

access congestion. Thus, the major advantage provided by the demonstration program is restricted to reducing commuters' driving costs. While these savings may appear large when computed on an annual basis, there is evidence to suggest that drivers do not fully perceive their driving costs. Moreover, previous studies have shown that commuters are more sensitive to travel time changes than cost changes in making their mode choice (5,6). The implication here is that many commuters may be reluctant to switch to ridesharing modes if the attendant cost reductions are offset by travel time increases.

Secondly, existing levels of ridesharing are already relatively high in the demonstration areas. At the CDC in the Pentagon Park site, 22% of employees currently carpool and another 3% are dropped off by another driver. At the South Central Minneapolis site, while carpooling participation is somewhat lower (17% at Honeywell, and 15% at Sears), bus commuting is relatively frequent (8% at Honeywell and 23% at Sears). Thus, total ridesharing levels are nearly 30% at Honeywell and nearly 50% at Sears (measured in terms of percent of person trips). A detailed analysis of the characteristics of current employees related to their commuting patterns is not available yet. However, to the extent that employees best suited to ridesharing arrangements* already are using carpools or buses, it will be difficult to attract large numbers of *new* participants to the program.

Finally, it should be noted that while in theory, coordinating the ridesharing demonstration at multi-employer sites has much merit,** opera-

*For example, those employees with long commute distances and regular working hours.

**Primarily because it increases the size of the potential ridesharing pool as discussed earlier.

tionally there are barriers to forming inter-company vanpools and carpools. Coordinating schedules is one problem. Working hours, holiday observance and seasonal overtime shifts all tend to vary across companies (as well as between divisions of single large employers). Moreoever, marketing and coordinating the program for the large number of small employers at the demonstration sites will be difficult. At the Pentagon Park site, for example, only 44 out of over 330 site employers have more than 25 employees.

The problems alluded to above do not stem from unique or idiosyncratic conditions at the three sites chosen for this demonstration. The provision of adequate parking at the demonstration sites is typical of industrial parks and suburban and central city employment centers outside the CBD and, in most cities non-CBD employment represents over three-fouths of the regional total. That there is a large number of small employers at the demonstration sites is not atypical of regional employment patterns. In short, the experience gained from this program should have wide application elsewhere.

The target commuter group for this demonstration fits somewhere in the spectrum between areawide carpool incentive programs at the one extreme and selected single employer initiatives at the other. Areawide programs have by and large yielded disappointing results (2). Single company initiatives, particularly those associated with parking incentives have had isolated success (3), but are inherently limited in scale. The outcome of this demonstration will hopefully extend the success of previous employer-based programs to multi-employer centers.

## 2.2 MAJOR DEMONSTRATION ISSUES

The demonstration will implement a unique approach to increasing work trip vehicle productivity in that a regional transit agency, the Metropolitan Transit Commission, will coordinate a variety of paratransit (ridesharing) services for employers working at selected multiple-employer sites. The demonstration will have local impacts on each of the five SMD goal areas. In order to ensure that the experience gained from this demonstration is transferable to other areas, careful attention must be devoted to evaluating several key issues as will be described in the sections below.

### 2.2.1 Marketing Effectiveness

The main concern here is to assess the effectiveness of the public transit agency in functioning as a marketer of ridesharing services. The evaluation must consider the strategies and changes in strategies pursued during the marketing of the ridesharing concept to employers and employees. Marketing strategies may differ by company size and type. Understanding these differences is an important aspect of the demonstration.

### 2.2.2 Legal/Institutional Barriers

In implementing the demonstration, several legal and institutional barriers may be encountered. For example, an interpretation of whether vanpool drivers fall under the provisions of the (federal) Fair Labor Standards Act was required* and the program has come under scrutiny with regard to the provisions of Section 13(c) of the UMTA (enabling) Act (49 U.S.C. § 1601 et seq (1976).**

*The Act governs wage rates and working conditions of employees.

**This legislation places restrictions on the use of federal funds "for the operation of mass transportation facilities or equipment in competition with or supplementary to the service provided by an existing mass transportation company."

Some of the legal/institutional issues will be of a site specific nature, others may be generalizable. In any event, the key point in evaluating the project is to document fully the problems encountered, the resolution (or lack of resolution) obtained, and the lessons learned, so that other agencies may benefit from the Minneapolis demonstration experience.

2.2.3 Administrative Framework and Problems Encountered

It is unrealistic to expect a project of this complexit to proceed without incurring some unanticipated administrative and operational problems. The evaluation should thus develop a *chronological* description of the administrative, technical, and coordination groundwork required to establish the brokerage system. Again the emphasis here is in providing a process description of the project.

2.2.4 System Coverage

Once the ridesharing program is underway, there are several issues involving operational characteristics and stability of the program that must be considered in the evaluation. One of these issues is system coverage. Other than the South Central Minneapolis site, bus service to the demonstration is limited. This demonstration has the potential of significantly extending the coverage area of high-occupany car and vanpools. The evaluation should determine the areas served for each type of service before and after implementation of the brokerage service.

2.2.5 Level of Service Changes

The evaluation should also address the level of service provided by the alternative ridesharing modes. Categories of service attributes to be addressed are expected total travel time, wait time, collection and distribution times, travel time reliability, and user cost for each service

type. Changes in level of service over the duration of the program should be noted. It is possible that as the program matures, and more potential participants apply through the broker, better matches (i.e., ridesharers in closer proximity) can be formed, thus reducing collection/distribution times.

### 2.2.6 Demand for Ridesharing Service

The issues here involve both descriptive and explanatory analyses. Descriptive analyses will characterize system ridership levels by mode, examine mode shifts, and determine differences in mode choice by commute distance, working hours, and user socioeconomic characteristics. Explanatory analyses will address the behavioral bases for commuters' travel choices. Given the level of service on the alternative modes and observing the actual mode choices of commuters, this analysis will infer the tradeoffs commuters make between level-of-service characteristics. Another important dimension of the demand analysis is to explore whether significant behavioral differences are exhibited by different *segments* of the commuting population. One example of a possible difference might be between employees whose working hours are rigid versus those whose working hours are flexible. Do these two groups place the same importance on travel time reliability? Other important market segments that should be analyzed include groups distinguished by auto-ownership level, income and employment type.

### 2.2.7 Ridesharing Participation Stability

This issue is of interest because it will indicate the extent to which continued marketing and matching brokerage services are necessary. In addition to determining the average tenure of carpool and vanpool participants, the evaluation should consider the reasons commuters give

for leaving their previous pool. This information may provide important operational guidelines for forming more stable pooling arrangements.

2.2.8 Productivity and Economics

The concern here is to assess the overall economic efficiency of the ridesharing program both from the perspective of the transportation broker (including an assessment of front end setup costs versus ongoing brokerage functions) and the ridesharing users. Costs per passenger and per vehicle mile should be analyzed for each of the services offered.

2.2.9 Vehicle Operations

The operational arrangements for carpooling will be left strictly up to the individual participants. Carpoolers can share driving responsibility with no money transfers, or work out an arrangement where full time passengers share the driver's commuting costs. It will be of interest to determine which carpool arrangements are most common and try to relate these arrangements to characteristics of the carpool (carpool size, longevity, car ownership fo the participants, and commute distance). Vanpool and custom bus operations will be relatively more structured: operational characteristics will by and large be worked out in advance although some flexibility still remains. Vanpool routing for pickup and dropoff of passengers may significantly affect individual passengers' level of service.* Driver absenteeism and vehicle breakdowns can also affect ridesharing level of service on an episodic basis. These factors should be fully understood and reported in the demonstration evaluation.

*Consider the difference in travel time of the first and last passenger to be picked up for example.

### 2.2.10 Employer Motivations

An important set of issues raised by the demonstration concerns the impacts of the program on employers. The experience gained from employer marketing, supplemented by followup interviews will provide valuable information.

Of interest here is how employers view the program at first contact, and how their perceptions may change over the period of the demonstration. The motivations of employers for cooperating or refusing to cooperate should be clearly understood. Differences in employer reactions by size of firm, type of business, parking conditions, and location should be determined.

### 2.2.11 Program Impact on Employee Performance

This issue refers to the impacts of the demonstration on employee on-time arrival, absenteeism, employee willingness to work overtime, effects on employee productivity, and employee morale.

## 2.3 MEASURES OF DEMONSTRATION EFFECTIVENESS

The previous section identified eleven key issues related to the Minneapolis ridesharing demonstration. The intent of this section is to identify the specific evaluation measures associated with each of these issues so that an assessment can be made of the extent to which the demonstration achieves its objectives. Three of the issues are inherently qualitative in nature, and thus the discussion of evaluation measures focuses on outlining the appropriate elements of a process description. The remaining eight issues can by and large be addressed in terms of quantitative measures. These measures are summarized in Tables 2.1 - 2.9.

Each measure in the tables is identified by a line number for use as a cross reference in the next chapter dealing with data collection method-

ologies.* The tables also indicate where appropriate the modes for which the measures will be collected. For this purpose, five modes are identified: auto drive (DA), carpool (CP), vanpool (VP), regular bus (RB), and custom bus (CB). The tables distinguish whether the data is to be collected on *before* (b) demonstration conditions** or *during* (d), whether the measure is *collected* raw data (coll) or *derived* from collected data (der). Finally the last column in the tables gives a data source code reference which will be defined and described in the following chapter.

For the sake of clarity, some measures that may be collected at different times or by different collection techniques, or for different market groups have been collapsed into single measures here, although these distinctions can be made during actual data collection. Although no notation is made in the tables, it should be noted that wherever appropriate, data will be collected and treated separately for each of the three demonstration sites.

The remainder of this section discusses the evaluation measures associated with each of the eleven issues identified earlier.

### 2.3.1 Measures Associated with Marketing Effectiveness

Assessing the effectiveness of the demonstration's marketing efforts must consider both employer and employee programs. The most important requirement for the evaluation associated with this issue is to provide a complete chronological record of the strategies undertaken including:

> a summary description of marketing techniques for large employers (those employing 50 or more), covering method of first contact, content and visual aids used during initial presentation, and techniques for continuing coordination.

*The measures are numbered x.y, where x is the issue number with reference to the previous section, and y is a sequential measure number.

**These data may be collected with retrospective survey questions during the demonstration.

a summary description of marketing techniques for small employers, indicating differences from large employer marketing techniques. Changes in techniques over the demonstration should be noted.

a summary description of employee-marketing techniques covering the format and content of structured mass presentations, the use of smaller, less formal presentations for special employee groups, the success of direct approaches to employees in smaller firms, and a description of the promotional material used (brochures, posters, etc.) and the method of dissemination.

The success of the marketing efforts can be measured in both qualitative and quantitative terms. Quantitative measures are summarized in Tables 2.1 and 2.2 for employer and employee marketing respectively. Measures 1.1, 1.2 and 1.7 provide an indication of the size and type of employers in the demonstration sites. It is likely that employer participation in the program will vary by size of firm and type of business. Measures 1.3-1.6 and 1.8 will be examined to assess this variation . Measure 1.9 seeks to identify the reasons employers give for not wanting to cooperate actively in the ridesharing promotion. It may not be possible to get a statistically reliable sample for this item since those not interested in the program are least likely to be willing to be surveyed on the subject. Nonetheless, even if presented in qualitative terms, this measure is important in better understanding employer motivations and in redesigning employer marketing techniques.*

Measures 1.10-1.16 provide some indication of the effectiveness of the employee marketing efforts. The initial push to organize mass-marketing presentation is only one element of the overall marketing program, and in fact, this element should become of less importance as the demonstration progresses and word-of-mouth, media and other promotional techniques at-

*A fuller discussion of employer motivations for both participating and non-participating firms is covered in 2.3.10.

TABLE 2.1 EVALUATION MEASURES ON EMPLOYER MARKETING

| Reference Number | Measure | Mode | | | | | Measurement Period | Variable Type | Source |
|---|---|---|---|---|---|---|---|---|---|
| | | DA | CP | VP | CB | RB | | | |
| 1.1 | Total number of potential participating employers | - | - | - | - | - | b,d | coll | 1.1 |
| 1.2 | Size distribution of employers (by number of employees) | - | - | - | - | - | b,d | der | 1.1 |
| 1.3 | Total number of participating employers | - | - | - | - | - | d | coll | 2.2 |
| 1.4 | Size distribution of participating employers | - | - | - | - | - | d | der | 1.1, 2.2 |
| 1.5 | Total number of employer refusals and non-responses | - | - | - | - | - | d | coll | 2.2 |
| 1.6 | Size distribution of non-participating employers | - | - | - | - | - | d | der | 1.1, 2.2 |
| 1.7 | Distribution of employers by employment type | - | - | - | - | - | d | der | 1.1 |
| 1.8 | Distribution of participating employers by employment type | | | | | | | der | 1.1, 2.2 |
| 1.9 | Reasons for participation/non-participation | - | - | - | - | - | d | coll | 2.1 |

TABLE 2.2 EVALUATION MEASURES ON EMPLOYEE MARKETING

| Reference Number | Measure | Mode | | | | | Measurement Period | Variable Type | Source |
|---|---|---|---|---|---|---|---|---|---|
| | | DA | CP | VP | CB | RB | | | |
| 1.10 | Total number of potential participating employees | - | - | - | - | - | b,d | coll | 3., 1.1 |
| 1.11 | Total number attending employee marketing presentations | - | - | - | - | - | d | coll | 4 |
| 1.12 | Fraction of seminar attendees indicating interest in ridesharing | - | x | x | x | x | d | coll | 4 |
| 1.13 | Fraction of seminar attendees indicating interest in ridesharing stratified by current mode choice | x | x | x | x | x | d | coll | 4 |
| 1.14 | Fraction of ridesharers whose pool was arranged by CS | - | x | x | x | x | d | coll | 5.1 |
| 1.15 | Fraction of CS-arranged ridesharers who attended ridesharing presentations | - | - | - | - | - | d | coll | 5.2,5.3,5.4 |
| 1.16 | Method by which employees first learned of Commuter Services(CS) stratified by current mode choice | x | x | x | x | x | d | coll | 5.1 |
| 1.17 | Fraction of new ridesharers who never considered ridesharing before demo | | | | | | d | coll | 5.2,5.3,5.4 |

tract new users. Measure 1.11 indicates the fraction of the total number (measure 1.10) of employees attending marketing presentations. Of those attending, measure 1.12 indicates what fraction were interested in one or more of the Commuter Services (CS) modes and measure 1.13 stratifies these results by current mode choice (i.e. before CS has provided assistance in finding a potential ridesharing match).

It is important to determine the modal shift patterns engendered by the program. Measure 1.13 will be useful in assessing whether those interested in ridesharing are currently ridesharing (e.g., by bus or carpool) or are largely driving alone. In section 2.4.6, measures will be developed to determine actual mode shift patterns (i.e., before-after mode choices) rather than solely the expression of interest considered here.

As noted earlier, as the demonstration progresses, the importance of the initial marketing presentations will diminish. This effect is captured first by measure 1.14 which expresses the fraction of ridesharers whose pool was arranged by CS*, and in measure 1.15 which expresses the fraction of CS-arranged ridesharers who attended a marketing presentation.

Item 1.17 measures the fraction of CS - assisted ridesharers who never seriously considered ridesharing before the demonstration. The issue here is whether previous drive-alone commuters chose this mode because they were simply unaware of the potential benefits of alternative modes or because they were unable to find a pooling arrangement or bus that offered competitive service.

*Many carpools will have been in existence before the demonstration or in any event be formed strictly by individual initiative.

Qualitative analyses of the effectiveness of the marketing strategies are another important aspect of the evaluation. As the demonstration is in many respects a pilot project, the qualitative assessment should be oriented towards an agency who might be considering establishing a similar transportation brokerage and is concerned with:

Employer Marketing

- Which approaches seem to work best?
- Should the initial contact be made by telephone or by mail?
- Which potential benefits should be stressed the most in making initial presentations?
- Which visual aids were most effective?
- Are multiple call-backs effective in bringing initially reluctant employers into the program?

Employee Marketing

- How enthusiastic was the response to the mass presentation?
- Did the employees find the presentation informative and interesting?
- What group size seemed to work best?
- Was there a marked difference in employee response depending on the type/size of group?
- What changes might be made to the marketing material used in this demonstration to make it more effective?

### 2.3.2 Measures Associated with Legal/Institutional Barriers

The intent here is to provide a summary of the legal and institutional barriers encountered in implementing the demonstration. There are no quantitative measures as such for this part of the evaluation. Rather, the description should focus on presenting the issues encountered, the actors involved and the outcomes achieved. If possible, the description will

also relate the legal/institutional issues encountered in the Minneapolis demonstration with the experience in other, similar demonstrations involving either a multimodal brokerage service, e.g., in Knoxville, Tennesse (7) or a vanpool service experiment, e.g., the Golden Gate demonstration in San Francisco or the Norfolk, Virginia, vanpool and contract hauler demonstration (8).

### 2.3.3 Measures Associated with Administrative Framework

Here too the emphasis will be on a qualitative chronological process description, oriented towards agencies that may be considering a brokerage service and are interested in learning the administrative and operational problems encountered in the Minneapolis demonstration.

### 2.3.4 Measures Associated with System Coverage

The measures associated with system coverage will be examined to determine the extent to which the demonstration effectively increases the service area of high occupancy commuting vehicles. Direct measures of service area are represented in Table 2.3 by items 4.5, the percent of the seven county area served* by each of the ridesharing modes and 4.1, giving the route mileage of regular and custom bus service. Another measure of system coverage relates to the number of commuters who could (potentially) use one or more of the ridesharing services. This information will be displayed by measures 4.2 - 4.4 in three ways:

> from preliminary survey data, the number of commuters who could be served considering only such criteria as regular working hours, non-seasonal employment, minimal requirements for a car during the business day, and residence in the seven county area
>
> from employee applications, the number of commuters who can actually be matched in one or more ridesharing services

*Based on actual ridership data collected at various times during the demonstration (see Chapter 3).

TABLE 2.3 EVALUATION MEASURES ON SYSTEM COVERAGE

| Reference Number | Measure | Mode | | | | | Measurement Period | Variable Type | Source |
|---|---|---|---|---|---|---|---|---|---|
| | | DA | CP | VP | CB | RB | | | |
| 4.1 | Route miles | - | - | - | x | x | b,d | coll | 1.3,6.2 |
| 4.2 | Vehicle miles of travel per day | x | x | x | x | - | b,d | coll,der | 5.1,6.1,6.2 |
| 4.3 | Person miles of travel per day | x | x | x | x | x | b,d | coll,der | 5.1,6.1,6.2 |
| 4.4 | Number of persons who could use service | - | x | x | x | - | d | der | 3,4 |
| 4.5 | Percent of seven county area with rideshare commuting | - | x | x | x | x | b,d | der | 1.4,5.1 |
| 4.6 | Time of service | - | x | x | x | x | b,d | coll | 5.1 |
| 4.7 | O-D trip matrix | x | x | x | x | x | b,d | coll | 5.1,1.4 |
| 4.8 | O-D distance matrix | - | - | - | - | - | - | coll | 1.5 |

from on-going survey data, the actual number of commuters using ridesharing services.

Measures 4.3 and 4.4 relating to travel distance by the various modes can be calculated both from *reported* distance given by employees in surveys and by using an O-D (origin destination) matrix (measure 4.8) in conjunction with an O-D trip matrix (measure 4.7) covering the three demonstration sites.

Time of service by all ridesharing modes (measure 4.6) is a final important indicator of service coverage, particularly for employees with working hours outside of the usual 8 am - 4:30 pm shift where conventional bus service is non existent.*

2.3.5 Measures Associated with Level of Service Changes

The level of service measures to be collected during the demonstration fall into three categories: travel time components (measures of both in-vehicle and out-of-vehicle times), travel costs as seen by the commuter, and indicators of travel time reliability.

Measures in the first category are given by items 5.1 - 5.7 in Table 2.4. Out-of-vehicle travel time components to be determined include access times, wait times (including transfers for buses), and egress times. In-vehicle time will be divided into a line haul segment and collection/ distribution segments in the case of carpools, vanpools and subscription bus.

Careful consideration must be given to the *definition* of level of service(LOS) data for specific modes, e.g., the meaning of wait time for bus passengers is straightforward - usually taken to be the time between a passenger's arrival at a bus stop and the arrival of the bus.

*For example, at the Pentagon Park/Normandale site, the last buses leaving the area in the afternoon depart between 4:43 and 5:39, depending on the route.

TABLE 2.4 EVALUATION MEASURES ASSOCIATED WITH LEVEL OF SERVICE CHANGES

| Reference Number | Measure | Mode | | | | | Measurement Period | Variable Type | Source |
|---|---|---|---|---|---|---|---|---|---|
| | | DA | CP | VP | CB | RB | | | |
| 5.1 | Mean access time (residential end) | - | x | x | x | x | d | coll | 5.2-5.5 |
| 5.2 | Mean wait time | - | x | x | x | x | d | coll | 5.2-5.5 |
| 5.3 | Mean in-vehicle time | x | x | x | x | x | d | coll | 5.1-5.5 |
| 5.4 | Mean egress time (employment end) | x | x | x | x | x | d | coll | 5.1-5.5 |
| 5.5 | Mean total travel time | x | x | x | x | x | b,d | coll | 5.1-5.5 |
| 5.6 | Mean circuity time | - | x | x | x | - | d | coll | 5.2-5.4 |
| 5.7 | Mean circuity time per passenger | - | x | x | x | - | d | der | 5.2-5.4 |
| 5.8 | Mean operating cost | x | x | - | - | - | b,d | coll,der | 1.7 |
| 5.9 | Mean parking cost | x | x | x | - | - | b,d | coll.der | 5.1,5.6 |
| 5.10 | Mean total cost | x | x | - | - | - | b,d | der | 5.1,5.6,1.7 |
| 5.11 | Mean fare | - | x | x | x | x | b.d | coll.der | 1.3,6.2,6.1, 5.2 |
| 5.12 | Distribution of fare payment method | - | x | - | - | x | d | coll | 5.2,6.6 |
| 5.13 | Variance in measures 5.1 - 5.10 (across individuals) | x | x | x | x | x | d | der | as above |
| 5.14 | Variance in departure time (over one week) | x | x | x | x | x | d | der | 5.1-5.5 |

TABLE 2.4 EVALUATION MEASURES ASSOCIATED WITH LEVEL OF SERVICE CHANGES (concluded)

| Reference Number | Measure | Mode | | | | | Measurement Period | Variable Type | Source |
|---|---|---|---|---|---|---|---|---|---|
| | | DA | CP | VP | CB | RB | | | |
| 5.15 | Variance in arrival time (over one week) | x | x | x | x | x | d | der | 5.1-5.5 |
| 5.16 | Mean difference between actual and scheduled arrival time | - | - | x | x | x | d | der | 5.2-5.5 |
| 5.17 | Variance in difference between actual and scheduled arrival time | - | - | x | x | x | d | der | 5.3-5.5 |
| 5.18 | Variance in total circuity time | - | x | x | x | - | d | der | 5.2-5.4 |

A somewhat similar definition may be used for vanpool passengers in cases where a fixed pickup schedule is established, although it may be argued that there is a difference between waiting at a bus stop and waiting at home. For carpools, where schedules may be less rigid, wait times may be defined in a number of ways, e.g., if a carpool passenger expects his/her ride to show up some time between 7:20 AM and 7:30 AM and on a given morning the carpool arrives at 7:25 AM, the relevant wait time could be defined as:

> the absolute difference between the actual arrival time and the earliest expected arrival time (5 minutes)
>
> the absolute difference between the actual arrival time and the expected or average wait time (0 minutes)
>
> zero as long as the arrival time is in the expected range (0 minutes)*.

Other level of service variables also have mode specific characteristics. Circuity, zero for drive-alone commuters, may be defined as the difference between the time or distance of a carpool or vanpool driver's trip (including passenger pickup) and what the time or distance would be for direct travel with no passenger pickup. As another example of the mode specific variation in level of service measures, it should be noted that carpool drivers will always have a longer in-vehicle time but a shorter (i.e., zero) wait time than their passengers.

User costs are measured by items 5.8 - 5.11 in Table 2.4. It is important to note that these items are intended to measure only those costs borne by users of the alternative commuting modes. Operator costs, fixed vehicle costs, and modal productivities are discussed in Section 2.3.8.

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*The first and second definitions are preferred here. In any event, model estimation should definitely test mode specific coefficients for wait time since the basis for defining wait time between modes differs.

Variable costs for auto drivers (alone or carpool) consist of operating costs and parking costs (if any). Carpool, vanpool, custom or regular bus passengers' costs consist of fares paid daily or over a longer term. Carpoolers who rotate driving responsibilities without fare payment face a cost equal to drive-alone costs times the fraction of commuting days per week they drive. Carpool-operating costs in any event should reflect the additional mileage generally driven (relative to driving alone) to pickup and discharge passengers.

Travel time reliability is an important aspect of ridesharing service. Measures 5.14 - 5.18 describe this component of LOS. All modes may be characterized by a variance in departure time, arrival time, and total travel over a suitable travel period (e.g., one week). For vanpools, and bus service, travel time reliability can also be measured relative to schedule time (measure 5.16, 5.17) although variance in vehicle arrival time (independent of schedule time) is a better measure of reliability.* Variance in total circuity time can be measured for carpools, vanpools, and custom bus.

### 2.3.6 Measures Associated with Demand for Ridesharing Services

Table 2.5 displays the measures of demand for ridesharing services. The first eleven measures are primarily indicators of before-demonstration demand patterns.** These are stratified by various criteria of whether or not employees are poolable. Ultimately, the impact of the program can be measured in terms of the ridesharing penetration of the poolable market.

*For example, if a van is always five minutes late, the service would not necessarily be considered unreliable.

**It should be noted that in this context, "before" demonstration demand refers to modal choices of employees before employee marketing, matching services, introductory meeting, etc, even though the data may be collected during the demonstration funding period.

TABLE 2.5 EVALUATION MEASURES ASSOCIATED WITH DEMAND FOR RIDESHARING SERVICES

| Reference Number | Measure | Mode | | | | | Measurement Period | Variable Type | Source |
|---|---|---|---|---|---|---|---|---|---|
| | | DA | CP | VP | CB | RB | | | |
| 6.1 | Total number of employees | - | - | - | - | - | b,d | coll | 1.1 |
| 6.2 | Distribution of employment by normal working hours | - | - | - | - | - | b | coll | 3.0, 4.0 |
| 6.3 | Distribution of employment by overtime requirements | - | - | - | - | - | b | coll | 3.0 |
| 6.4 | Distribution of employment by need for car during working hours | - | - | - | - | - | b | coll | 3.0 |
| 6.5 | Total potential poolable | - | - | - | - | - | b | der | 3.0, 4.0 |
| 6.6 | Total non-poolable | - | - | - | - | - | b | der | 3.0,4.0 |
| 6.7 | Mode choices for poolable | x | x | x | x | x | b | der | 3.0,4.0 |
| 6.8 | Mode choices for non-poolable | x | x | x | x | x | b | der | 3.0,4.0 |
| 6.9 | Mode choices stratified by normal work shift | x | x | x | x | x | b | der | 3.0,4.0 |
| 6.10 | Mode choice stratified by business use of car | x | x | x | x | x | b | der | 3.0 |
| 6.11 | Mode choice stratified by overtime requirements | x | x | x | x | x | b | der | 3.0 |
| 6.12 | Frequency of use of usual mode choice | x | x | x | x | x | b,d | coll | 3.0,5.1 |

TABLE 2.5 (continued)

| Reference Number | Measure | Mode | | | | | Measurement Period | Variable Type | Source |
|---|---|---|---|---|---|---|---|---|---|
| | | DA | CP | VP | CB | RB | | | |
| 6.13 | Vehicle occupancy by mode | - | x | x | x | - | b,d | coll | 3.0,5.1-5.4 |
| 6.14 | Overall average vehicle occupancy | - | - | - | - | - | b,d | der | 3.0,5.1-5.4 |
| 6.15 | Mode choice stratified by employee sex | x | x | x | x | x | b,d | der | 3.0,5.1 |
| 6.16 | Mode choice stratified by auto ownership | x | x | x | x | x | b,d | der | 3.0,5.1 |
| 6.17 | Distribution of auto ownership | - | - | - | - | - | b,d | coll | 3.0,5.1 |
| 6.18 | Distribution of income | - | - | - | - | - | d | coll | 5.1 |
| 6.19 | Mode choice by income | x | x | x | x | x | d | der | 5.1 |
| 6.20 | Mode choice stratified by commute distance | x | x | x | x | x | b,d | der | 3.0,5.1,1.5 |
| 6.21 | Change in auto ownership-population as a whole | - | - | - | - | - | b,d | coll | 3.0,5.1 |
| 6.22 | Change in auto ownership-ridesharers only | | x | x | x | x | b.d | coll | 5.1-5.5 |
| 6.23 | Attitudes towards driving alone. ridesharing | - | - | - | - | - | d | coll | 5.1-5.5 |
| 6.24 | User attitudes stratified by mode choice | x | x | x | x | x | d | der | 5.1-5.5 |

TABLE 2.5 (concluded)

| Reference Number | Measure | Mode | | | | | Measurement Period | Variable Type | Source |
|---|---|---|---|---|---|---|---|---|---|
| | | DA | CP | VP | CB | RB | | | |
| 6.25 | Number of parked vehicles at site | — | — | x | — | — | b,d | coll | 6.1 |
| 6.26 | Number of custom buses in operation | — | — | — | x | — | d | coll | 6.2 |
| 6.27 | Number of carpools in operation | — | x | — | — | — | b,d | coll | 5.1 |
| 6.28 | Change in number of 2 person carpools | — | x | — | — | — | b,d | der | 5.1,5.2 |
| 6.29 | Change in number of 3 person carpools | — | x | — | — | — | b,d | der | 5.1,5.2 |
| 6.30 | Change in number of 4+ person carpools | — | x | — | — | — | b,d | der | 5.1,5.3 |
| 6.31 | Alternative mode when not ridesharing (for ridesharers only) | — | x | x | x | x | d | coll | 5.2-5.5 |

Another measure of commuting patterns of demand is given by item 6.12, the frequency of use (days per week) of employees' usual commuting mode. Gaining information on this aspect of work commuting is important both for identifying potential carpool/vanpool matches and for evaluating the impacts of the project.

Aggregate indicators of demand for alternative modes are given by measures 6.13, 6.14, and 6.25 - 6.27 which develop vehicle occupancy levels and number of commuting vehicles. Other measures given in Table 2.4 stratify demand levels by commute distance, and employee demographics: sex, auto ownership, and income. Finally, measures 6.23 and 6.24 develop attitudinally scaled indicators of employee perceptions of modal services.

2.3.7 Measures Associated with Ridesharing Participation Stability

An important aspect of the ridesharing brokerage demonstration is the extent to which there is a continuing need to provide assistance (e.g., matching of suitable passengers) to potential users. The measures given in Table 2.6 provide indicators of the dynamics of ridesharing formation.

Measure 2.6 describes how long employees have used their current mode choice. As some of the modes (e.g., vanpooling, subscription bus, new carpools) will just be starting during this demonstration, these data will not yield an accurate measure of the average mode-choice tenure; measures of average duration will clearly be lower bound estimates. The duration of employees' *previous mode choice* (measure 7.4) will give a more accurate indication of mode choice stability and importantly, for carpools will provide information on how long rideshare arrangements remain intact. Changes in ridership in vanpools and custom bus can be monitored monthly from normally collected accounting data (see Chapter 3).

TABLE 2.6 EVALUATION MEASURES ASSOCIATED WITH RIDESHARING PARTICIPATION STABILITY

| Reference Number | Measure | Mode | | | | | Measurement Period | Variable Type | Source |
|---|---|---|---|---|---|---|---|---|---|
| | | DA | CP | VP | CB | RB | | | |
| 7.1 | Duration of current mode choice | x | x | x | x | x | d | coll | 5.1 |
| 7.2 | Duration of current mode choice stratified by employee tenure at current work place | x | x | x | x | x | d | coll | 5.1 |
| 7.3 | Previous mode choice | x | x | x | x | x | d | coll | 5.1-5.5 |
| 7.4 | Duration of previous mode choice | x | x | x | x | x | d | coll | 5.1-5.5 |
| 7.5 | Monthly fluctuation in vanpool/ custom bus size | - | - | x | x | - | d | coll | 6.1,6.2 |
| 7.6 | Reasons for switching from previous mode | x | x | x | x | x | d | coll | 5.1-5.5 |

Measure 7.6 relates the reasons employees give for switching modes. These data should provide important insights on operational problems of ridesharing services.

### 2.3.8 Measures Associated with Productivity and Economics

These measures are summarized in Table 2.7. Basic data collection items include revenue by mode, modal operating costs and demonstration brokerage costs.

Revenue determination for vanpool and subscription bus operations should be relatively straight forward as this data will be a by-product of monthly reporting requirements. Regular bus revenues for only those passengers destined for the demonstration sites will have to estimated from demand figures (e.g., measure 6.12). Total bus revenue for all routes serving the demonstration sites can also be used as an indicator of the revenue impacts of the demonstration (although these figures will also include passengers not directly encompassed by the program). Carpool revenues can be computed at least for those carpool drivers who collect fares from their passengers. For carpoolers who share the driving responsibility without fare transactions, "revenues" can be construed as operating cost savings (relative to drive alone commuting).

As with revenue measures, cost data (measures 8.6 - 8.22) for both operating and fixed components will be most readily available for vanpool and custom bus operations. For automobile commuters and carpoolers, unit cost data may have to be computed from external sources (9), although certain fixed cost elements (e.g., insurance can be collected by survey. Cost and revenue comparisons will be made on the basis of per passenger and per passenger mile.

TABLE 2.7 EVALUATION MEASURES ASSOCIATED WITH PRODUCTIVITY AND ECONOMICS

| Reference Number | Measure | Mode | | | | | Measurement Period | Variable Type | Source |
|---|---|---|---|---|---|---|---|---|---|
| | | DA | CP | VP | CB | RB | | | |
| 8.1 | Total monthly revenue | - | - | x | x | - | d | coll | 6.1,6.2 |
| 8.2 | Estimated revenue | - | x | - | - | x | d | coll | 5.1,5.2,6.6 |
| 8.3 | Revenue per passenger | - | x | x | x | x | d | der | 5.1,5.2,6.1, 6.2 |
| 8.4 | Revenue per vehicle mile | - | x | x | x | x | d | der | 6.6 |
| 8.5 | Revenue per passenger mile | - | x | x | x | x | d | der | |
| 8.6 | Total operating cost-automobile | x | x | - | - | - | d | der | 1.7 |
| 8.7 | Total operating cost-vanpool | - | - | x | - | - | d | coll | 6.1,6.3 |
| 8.8 | Total operating cost-bus (route specific) | - | - | - | x | x | d | coll | 6.7 |
| 8.9 | Operating cost breakdown | - | - | x | x | - | d | coll | 6.1,6.3 |
| 8.10 | Revenue-Operating Cost | - | x | x | x | x | d | der | from above measures |
| 8.11 | (Revenue-Operating Cost) per passenger | - | x | x | x | x | d | der | |
| 8.12 | Estimated automobile ownership costs | x | x | - | - | - | d | der | 1.7,5.1 |
| 8.13 | Total auto costs (allocated) per year | x | x | - | - | - | d | der | 1.7,5.1 |

TABLE 2.7 (continued)

| Reference Number | Measure | Mode | | | | | Measurement Period | Variable Type | Source |
|---|---|---|---|---|---|---|---|---|---|
| | | DA | CP | VP | CB | RB | | | |
| 8.14 | Total auto costs per passenger mile | x | x | - | - | - | d | der | 1.7,5.1,5.2 |
| 8.15 | Vanpool lease costs | - | - | x | - | - | d | coll | 6.8 |
| 8.16 | Vanpool insurance costs | - | - | x | - | - | d | coll | 6.8 |
| 8.17 | Vanpoql administrative costs | - | - | x | - | - | d | coll | 6.8 |
| 8.18 | Other fixed vanpool costs | - | - | x | - | - | d | coll | 6.2,6.4,6.8 |
| 8.19 | Total vanpool costs per year, per van | - | - | x | - | - | d | | |
| 8.20 | Total vanpool costs per passenger mile | - | - | x | - | - | d | der | 6.2,6.4,6.9 |
| 8.21 | Fixed costs of custom bus per bus per year | - | - | - | x | - | d | der | 6.9 |
| 8.22 | Total custom bus costs per passenger mile | - | - | - | x | - | d | der | 6.4,6.9 |
| 8.23 | Total cost of brokerage service | - | - | - | - | - | d | coll | 6.10 |
| 8.24 | Front-end brokerage marketing cost | - | - | - | - | - | d | coll | 6.10 |
| 8.25 | On-going brokerage costs | - | - | - | - | - | d | coll | 6.10 |
| 8.26 | Share of brokerage cost contributed by source | - | - | - | - | - | d | coll | 6.10 |

TABLE 2.7 (concluded)

| Reference Number | Measure | Mode | | | | | Measurement Period | Variable Type | Source |
|---|---|---|---|---|---|---|---|---|---|
| | | DA | CP | VP | CB | RB | | | |
| 8.27 | Marketing costs per ridesharer attracted (new ridesharers only) | - | - | - | - | - | d | der | 6.10,5.1-5.5 |

Finally, costs and revenue sources of operating the demonstration brokerages service will be determined. To the extent possible, costs will be split between "front-end" marketing and set up costs and ongoing costs.

These costs will also be estimated (measure 8.26) on a per passenger basis for passengers attracted to ridesharing service following the initiation of demonstration.

### 2.3.9 Measures Associated with Vehicle Operation

These measures (Table 2.8) deal with carpool, vanpool and custom bus operating policies with respect to driver responsibilities (measures 9.1, 9.2), fare payment (measure 9.3), vehicle routing, scheduling, and fare adjustments for absenteeism (measure 9.5).

Other important considerations in evaluating vehicle operation include the breakdown and accident incidence and resulting delays/ absenteeism, (measures 9.6 - 9.9) and the number and allocation of priority parking spaces reserved for high occupancy vehicles (measure 9.10).

### 2.3.10 Measures Associated with Employer Motivation

The output here will consist of tabulating a sample of employers' perception of the program. The analysis will be qualitative with the intent of recording the responses of a representative cross-section of employers embodying a range of firm sizes and types. Possible motivations are to be presented to employers in the early marketing stages. These include stronger employee/employer relations, recruiting advantages and expanded labor market, improved employee on-time arrival and decreased absenteeism, improved productivity, enhanced community relations and reduced parking requirements (10,11,12). The intent of this part of the

TABLE 2.8 EVALUATION MEASURES ASSOCIATED WITH VEHICLE OPERATIONS

| Reference Number | Measure | Mode | | | | | Measurement Period | Variable Type | Source |
|---|---|---|---|---|---|---|---|---|---|
| | | DA | CP | VP | CB | RB | | | |
| 9.1 | driver, passenger(s) by carpool size | - | x | - | - | - | b,d | coll | 5.2 |
| 9.2 | driving responsibilities by carpool size | - | x | - | - | - | b,d | coll | 5.2 |
| 9.3 | transfers | - | x | - | - | - | d | coll | 5.2 |
| 9.4 | Number of carpools with above operational variants stratified by longevity, car ownership of participants and commute distance | - | x | - | - | - | d | der | 5.2 |
| 9.5 | Number of vans/custom buses having specific operating rules with respect to vehicle routing, vehicle scheduling, fare adjustments for absenteeism, other variants | - | - | x | x | - | d | coll | 5.3,5.4 |
| 9.6 | Frequency of vehicle breakdowns | x | x | x | x | x | d | coll | 5.1-5.5 |
| 9.7 | Delays, absenteeism resulting from breakdown | x | x | x | x | x | d | coll | 5.1-5.5 |
| 9.8 | Frequency of accidents | x | x | x | x | x | d | coll | 5.1-5.5 |

TABLE 2.8 (concluded)

| Reference Number | Measure | Mode | | | | | Measurement Period | Variable Type | Source |
|---|---|---|---|---|---|---|---|---|---|
| | | DA | CP | VP | CB | RB | | | |
| 9.9 | Delays, absenteeism resulting from accidents | x | x | x | x | x | d | coll | 5.1-5.5 |
| 9.10 | Number and allocation of priority parking spaces | - | x | x | - | - | d | coll | 5.6 |

evaluation is to measure the extent to which a sample of employers perceives these or other motivations after experiencing the program.

### 2.3.11 Measures Associated with Employee Performance

Measures relating to the impacts of the demonstration on employee performance are summarized in Table 2.9. These include absenteeism, on-time arrival and willingness/ability to work overtime as a function of commuting mode. Collection of this data will depend on the cooperation of participating employers, and some problems are anticipated in getting consistent and complete information.

TABLE 2.9 EVALUATION MEASURES ASSOCIATED WITH IMPACT ON EMPLOYEE PERFORMANCE

| Reference Number | Measure | Mode | | | | | Measurement Period | Variable Type | Source |
|---|---|---|---|---|---|---|---|---|---|
| | | DA | CP | VP | CB | RB | | | |
| 11.1 | Absenteeism rates by commuting mode | x | x | x | x | x | b,d | coll | 5.6 |
| 11.2 | On-time arrival rates by commuting mode | x | x | x | x | x | b,d | coll | 5.6 |
| 11.3 | Willingness to work overtime (qualitative assessment) by commuting mode | x | x | x | x | x | b.d | coll | 5.6 |

# 3. DATA COLLECTION PLAN

## 3.1 INTRODUCTION

The previous section outlined the quantitative and qualitative evaluation measures required to assess comprehensively the impacts of the Minneapolis ridesharing demonstration. In this section, we present the data collection strategy proposed for the evaluation. In developing the strategy, the following considerations were taken into account.

> The data collection plan should draw heavily on information and data already collected and processed by the grant recipient. Because a key objective of the evaluation is measuring demonstration impacts in a "before-after" sense, heavy reliance must be placed on data describing pre-implementation conditions. In many instances, these data will be the only "before" information available.
>
> The data collection plan should recognize and be largely consistent with data collection plans already scheduled by the grant recipient.
>
> In designing the data collection instruments and techniques, alternative approaches should be considered. Where appropriate, the data collection plan presented here will discuss the pros and cons of alternative strategies and explain why specific approaches were chosen.
>
> It may be desirable to build in redundancy in the collection of certain key variables. In other words, different techniques may be used to determine the same variable or measure. As an example, traffic counts and surveys may both yield information on ridership levels. This built in redundancy will serve to increase the reliability of the data collection efforts.

The principal data sources to be used during evaluation are shown in Table 3.1. These data sources are divided into six major categories, ranging from existing external source data (e.g. zonal maps and site descriptions) to new data collection efforts specifically designed for the evaluation (e.g. surveys). Each data source is given a reference code in Table 3.1. It is this code that was noted in Tables 2.1 - 2.9 in the previous chapter; e.g., by cross-referencing Tables 2.5 and 3.1, it can be seen that measure 6.20, "mode choice stratified by commute distance" will be derived from sources

TABLE 3.1 DATA COLLECTION SOURCES

| Data Source | Reference Code |
|---|---|
| Demonstration Site Data and External Activity Descriptors | 1.0 |
| Inventory of firms by employment size and type | 1.1 |
| Physical site description: regional access, internal access, parking capacity, site maps) | 1.2 |
| Route schedules/maps for regular bus services | 1.3 |
| Data collection zone (DCZ) maps | 1.4 |
| DCZ O-D travel distance matrices | 1.5 |
| DCZ O-D travel time matrices | 1.6 |
| Local data on auto operating costs | 1.7 |
| Records of Employer Marketing Activity | 2.0 |
| Employer marketing logs | 2.1 |
| Employer marketing summary statistics | 2.2 |
| Preliminary Travel Surveys | 3.0 |
| Applications for Ridesharing Services | 4.0 |
| Surveys | 5.0 |
| Follow up employee surveys | 5.1 |
| Carpool supplementary survey and driving logs | 5.2 |
| Vanpool supplementary survey and driving logs | 5.3 |
| Custom bus supplementary survey and driving logs | 5.4 |
| Regular bus supplementary surveys | 5.5 |
| Employer surveys | 5.6 |
| Operating Data and Financial Reports | 6.0 |
| Vanpool revenue and expense reports (monthly) | 6.1 |

TABLE 3.1, continued

| | |
|---|---|
| Custom bus revenue and expense reports (monthly) | 6.2 |
| Vanpool maintenance logs (periodic) | 6.3 |
| Custom bus maintenance logs | 6.4 |
| Van accident reports | 6.5 |
| Regular bus revenue data (route specific) | 6.6 |
| Regular bus operating cost data (route specific) | 6.7 |
| Vanpool services financial data | 6.8 |
| Custom bus operating cost and financial data | 6.9 |
| MTC project cost data | 6.10 |

3.0, 5.1 and 1.5, the preliminary travel surveys, follow-up employee surveys, and data-collection-zone origin-destination travel-distance matrices.

In some instances, single references in Table 3.1 actually refer to a series of data collection activities, e.g., "follow-up employee surveys" (reference code 3.0) will actually be conducted at three distinct time periods at the three demonstration sites. In other cases, references to data (e.g., inventory of firms) may actually come from a variety of physical data sources. The remainder of this chapter will discuss each of the data collection items given in Table 3.1. A schedule of data collection activities is presented in Section 3.7.

## 3.2 DEMONSTRATION SITE DATA AND EXTERNAL ACTIVITY DESCRIPTORS

A critical data item for the evaluation, and indeed, for management of the demonstration itself is an inventory of firms by employment size and type. Many of the questions pertaining to marketing effectiveness and ridership response are expected to vary, depending on firm size and type characteristics.

Several sources may be used in compiling these data: records from building managers, business directories, published reports of the Minneapolis Planning and Development Department to name a few. Aggregate site employment figures as well as employment levels for the larger employers were cited in PSO's final report to MTC (12). An inventory of firms and square footage of office space was provided by the Pentagon Park office developer (see Figure 3.1) but neither employment figures nor business type were available. An essential activity therefore is for Commuter Services (CS)*

*Throughout this chapter, reference will be made to CS functions without distinguishing the specific agency (MTC, PSO, VSI) involved since in many instances these three groups jointly work on administering the ridesharing brokerage. As an example here, both PSO and MTC's Area Office are actively conducting employer marketing.

PENTAGON PARK

4600 W. 77th St.

| Suite No. | Tenant Name | Sq. Ft. |
|---|---|---|
| 13-250 | Equitable Life Assurance Soc. | 6,935 |
| 13-275 | Mac Donald, E. F. Co. | 696 |
| 13-280 | Mahowald, Wallace F. | 286 |
| 13-304 | Murphy Oil Co. | 1,890 |
| 13-305 | Vacant | 358 |
| 13-306 | Vacant | 568 |
| 13-312 | AMP Inc. | 1,158 |
| 13-319 | AMP Special Industries | 762 |
| 13-321 | Vacant | 576 |
| 13-323 | Promotional Dynamics | 600 |
| 13-328 | Continental Western Ins. Co. | 4,011 |
| 13-339 | Vacant | 659 |
| 13-343 | Vacant | 364 |
| 13-349 | Peak Productions | 349 |
| 13-353 | Vickers, Sperry | 520 |

4570 W. 77th St.

| Suite No. | Tenant Name | Sq. Ft. |
|---|---|---|
| 14-101 | Delta Dental Plan of Minn. | 6,940 |
| 14-135W | Johnson, Richard D. | 279 |
| 14-136 | Combined Ins. Co. of America | 409 |
| 14-139W | Delta Dental Plan of Minn. | 988 |
| 14-142 | Combined Ins. Co. of America | 1,501 |
| 14-150 | National Steel Corp. | 1,267 |
| 14-155W | National Business Systems | 320 |
| 14-165W | Parker Sales, Inc. | 656 |
| 14-179 | Combined Ins. Co. of America | 770 |
| 14-201 | Physicians Mutual Ins. Co. | 960 |
| 14-210 | Market Administrator | 4,740 |
| 14-224 | C B S Inc. | 1,117 |
| 14-227 | London Productions Inc. | 606 |
| 14-238 | Security Insurance Co. | 2,496 |
| 14-239 | Morin, Augie Associates Inc. | 726 |

FIGURE 3.1 PARTIAL PENTAGON PARK TENANT INVENTORY

to request information on employment size and type (primary activity) for each employer contacted during initial marketing efforts.* These data should be recorded on the Employer Marketing Logs discussed in the next Section. Employment type should be classified using a modified industrial categorization as indicated in Table 3.2. In developing the inventory, care should be taken to record only the number of employees actually working at each establishment. Excluded in this count, for example, would be sales representatives assigned to, but rarely working at, a district sales outlet. Firms where this type of distinction may be important include insurance, repair/service and (regional) sales establishments.

Additional site data required for the evaluation include a brief written description of each of the three demonstration sites (reference code 1.2, Table 3.1), highlighting regional access, internal access, parking capacity, and other characteristics which might influence commuting patterns but which might not be readily apparent from the collected data. Site maps for each demonstration area should be prepared by CS, indicating the location of major office buildings, parking lots, and access roads.

A description of regular bus services (reference code 1.3) to the demonstration sites will be a natural by-product of CS' promotional brochures on transit service. Figures 3.2 and 3.3 give examples of existing promotional material for the Pentagon Park/Normandale site. Similar material for the other two sites should be provided to the evaluation contractor as soon as it becomes available.

---

*These data should be collected even if the employer is not interested in participating in the programs.

TABLE 3.2 OMB TWO-DIGIT STANDARD INDUSTRIAL CLASSIFICATION

| Category | Two Digit Code | Description |
|---|---|---|
| D | 20-39 | Manufacturing |
| E | 40-49 | Transportation, Communication, Utilities |
| F | 50-51 | Wholesale Trade |
| G | 52-59 | Retail Trade |
| H | 60-67 | Finance, Insurance, Real Estate |
| I | 70-89 | Services |
| J | 91-97 | Public Administration |
| K | 99 | Non-classifiable |
| ** | ** | Sales Outlet |
| ** | ** | General Corporate Headquarters |

*Note that the categorization below assumes no employment in the basic industries with two digit SIC code less than 20. Thus, we are excluding employment in agriculture, forestry, fishing, mining and construction (OMB categories A, B and C).

** Special category; no directly comparable SIC code.

## BLOOMINGTON

Route 48A,B

**A.M.** — 48A — NORTHBOUND

| 98th & Penn | 102nd & France | Transfer to 6EK 76th & France | Pentagon-Normandale |
|---|---|---|---|
| 7:25 | 7:29 | 7:53 | 7:55 |
| 7:40 | 7:44 | 8:22 | 8:24 |

48B — SOUTHBOUND — **P.M.**

| Pentagon-Normandale | Transfer to 6EK 76th & France | 102nd & France | 98th & Penn |
|---|---|---|---|
| 3:46 | 3:55 | 4:02 | 4:06 |
| 4:13 | 4:25 | 4:33 | 4:37 |
| 4:51 | 4:55 | 5:03 | 5:07 |
| 5:12 | 5:22 | 5:30 | 5:34 |

*Take 48A in A.M. and 48B in P.M.

**A.M.** — 48B — NORTHBOUND

| 86th & Lyndale | Southtown | NW Finance | Transfer to 6EK Southdale | Pentagon-Normandale |
|---|---|---|---|---|
| 7:14 | 7:19 | 7:21 | 7:39 | 7:55 |
| 7:29 | 7:34 | 7:39 | 8:08 | 8:24 |
| 8:15 | 8:20 | 8:22 | 8:34 | 8:49 |

48A — SOUTHBOUND — **P.M.**

| Pentagon-Normandale | Transfer to 6EK Southdale | NW Finance | Southtown | 86th & Lyndale |
|---|---|---|---|---|
| 3:46 | 4:20 | 4:27 | 4:29 | 4:34 |
| 4:51 | 5:20 | 5:27 | 5:29 | 5:34 |

*Take 48B in A.M. and 48B in P.M.

## RICHFIELD — EDINA

Route 15 — 66TH ST. CROSSTOWN

**A.M.**

| 66th & Nicollet | Penn | Transfer to 6EK Southdale | Pentagon-Normandale |
|---|---|---|---|
| 6:17 | 6:24 | 6:34 | 6:49 |
| 6:39 | 6:44 | 7:03 | 7:18 |
| 6:55 | 7:00 | 7:20 | 7:34 |
| 7:20 | 7:25 | 7:39 | 7:55 |
| 7:54 | 7:59 | 8:08 | 8:24 |
| 8:09 | 8:14 | 8:34 | 8:49 |

**P.M.**

| Pentagon-Normandale | Transfer to 15A Southdale | Penn | 66th & Nicollet |
|---|---|---|---|
| 3:15 | 3:48 | 3:52 | 3:58 |
| 3:46 | 4:16 | 4:20 | 4:26 |
| 4:13 | 4:43 | 4:47 | 4:53 |
| 4:15 | 4:57 | 5:01 | 5:07 |
| 4:51 | 5:20 | 5:24 | 5:30 |
| 5:12 | 5:40 | 5:44 | 5:50 |

## APPLE VALLEY — BURNSVILLE

Route 32 — FREEWAY FLYER

**A.M.**

| 142nd & Cedar | Apple Valley Center | Nicollet & Co. Rd. 42 | 126th & Pillsbury | Pentagon-Normandale |
|---|---|---|---|---|
| 6:58 | 7:02 | 7:20 | 7:15 | 7:33 |

**P.M.**

| Pentagon-Normandale | 126th & Pillsbury | Nicollet & Co. Rd. 42 | Apple Valley Center | 142nd & Cedar |
|---|---|---|---|---|
| 4:43 | 5:10 | 5:16 | 5:24 | 5:28 |

## HOPKINS — ST. LOUIS PARK — EDINA

Route 36

**A.M.**

| 44th & Woodale | 50th & Woodale | Transfer to 6EK Southdale | Pentagon-Normandale |
|---|---|---|---|
| 6:40 | 6:45 | 7:03 | 7:18 |
| 7:20 | 7:25 | 7:39 | 7:55 |
| 8:00 | 8:05 | 8:34 | 8:49 |

**P.M.**

| Pentagon-Normandale | Transfer to 36 Southdale | 50th & Woodale | 44th & Woodale |
|---|---|---|---|
| 3:15 | 4:00 | 4:10 | 4:15 |
| 4:13 | 4:40 | 4:50 | 4:55 |
| 4:51 | 5:30 | 5:40 | 5:45 |

## MINNEAPOLIS — EDINA

Route 35T

**A.M.**

| 2nd & Marquette | Lake & 35W | 66th & Penn | 76th & Parklawn* |
|---|---|---|---|
| 6:18 | 6:28 | 6:38 | 6:45 |
| 6:38 | 6:48 | 6:58 | 7:05 |
| 6:48 | 6:58 | 7:08 | 7:15 |
| 7:13 | 7:23 | 7:33 | 7:40 |

**P.M.**

| 76th & Parklawn | 66th & Penn | Lake & 35W | 7th & 2nd |
|---|---|---|---|
| 4:39 | 4:54 | 5:04 | 5:14 |
| 5:09 | 5:24 | 5:34 | 5:44 |
| 5:39 | 5:54 | 6:04 | 6:14 |

*This route enters Pentagon-Normandale at 76th & France and terminates at 76th & Parklawn Ave.

## MINNEAPOLIS — EDINA

Route 6EK

**A.M.**

| Lake & Hennepin | 39th & Sheridan | 54th & France | 60th & Xerxes | Southdale | Pentagon/ Normandale |
|---|---|---|---|---|---|
| 6:16 | 6:21 | — | 6:30 | 6:34 | 6:49 |
| 6:41 | 6:46 | — | 6:55 | 7:03 | 7:18 |
| 6:58 | 7:04 | 7:14 | — | 7:20 | 7:34 |
| 7:18 | 7:24 | — | 7:35 | 7:39 | 7:55 |
| 7:47 | 7:53 | — | 8:04 | 8:08 | 8:24 |
| 8:09 | 8:15 | — | 8:26 | 8:34 | 8:49 |

**P.M.**

| Pentagon | Southdale | 60th & Xerxes | 54th & France | 39th & Sheriden | Lake & Hennepin |
|---|---|---|---|---|---|
| 3:15 | 3:34 | 3:38 | — | 3:49 | 3:55 |
| 3:46 | 4:01 | 4:05 | (1) | 4:16 | 4:22 |
| 4:13 | 4:32 | 4:36 | — | 4:47 | 4:53 |
| 4:15 | 4:43 | 4:47 | — | 4:58 | 5:04 |
| 4:51 | 5:07 | 5:11 | — | 5:22 | 5:28 |
| 5:12 | 5:28 | 5:32 | — | 5:43 | 5:49 |

For France Ave. service - transfer at Southdale to 6D.
(1) Depart Southdale 4:12, arrive 54th & France 4:19.

FIGURE 3.2 EXAMPLE OF TRANSIT SCHEDULE PREPARED FOR PENTAGON PARK PROMOTIONAL BROCHURE

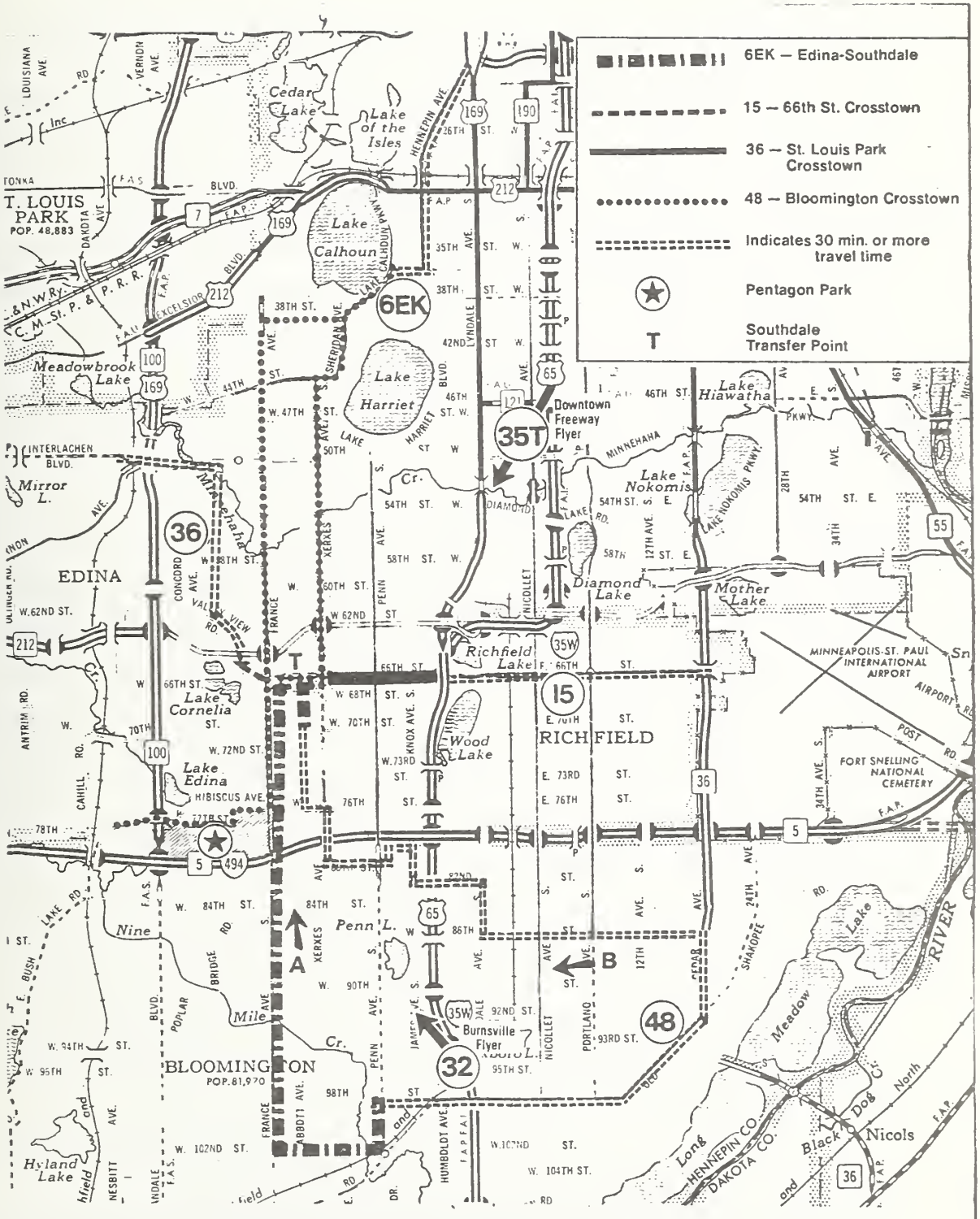


FIGURE 3.3 EXAMPLE OF TRANSIT ROUTE MAP PREPARED FOR PENTAGON PARK PROMOTIONAL BROCHURE

Data items 1.4 to 1.6 in Table 3.1 refer to information on a traffic zone system established for the Twin Cities region. There are approximately 1200 Date Collection Zones (DCZ) covering the metropolitan area. All carpool address matching and other computer processing done by MNDOT is organized on a DCZ basis. The evaluation contractor will require travel distance and travel time (highway and transit) matrices in machine readable format. In addition, processed preliminary surveys (see Section 3.4) should be made available in machine readable format with DCZ residence zone data appended to each record. The preliminary travel survey (see Figure 1.2) requests employees to enter home address. Therefore, some processing will be required to convert address to DCZ residence zone. These data will be used in the evaluation in assessing "before" work mode choice commuting patterns by travel distance and travel time. In addition, these data can be used to assess the distribution of workers' residence location for each of the demonstration sites, a key measure affecting the demand for ridesharing services. One problem that will be encountered here is that available network data (i.e., distance and time skim trees) is organized by Traffic Analysis Zone (TAZ) and carpool matching is being conducted on a DCZ basis. The evaluation contractor will contact MNDOT directly to arrange how the discrepancy in analysis zone systems can best be resolved.

The final data item concerns determining current automobile operating costs for the Twin Cities area. It is anticipated that this data will be available from local planning agencies,* or published source data (9). The primary use for this data will be in comparing the costs of drive-alone commuting with alternative ridesharing modes.

In summary, all of the data needs discussed above should be readily available

*For example, the Metropolitan Council recently sponsored R.H. Pratt and DTM,Inc. to estimate mode choice models from the 1970 Twin Cities home interview survey. Data used in estimating these models required an assumption on auto operating costs (14).

in either existing published data (e.g., DCZ zone maps) or be available as a normal by-product of presently planning marketing/operational activities (e.g., inventory of firms).

## 3.3 RECORDS OF EMPLOYER MARKETING ACTIVITY

These data will be the primary source of information on employment inventories, number of participating employers, extent of employer support (e.g., preferential parking, willingness to adjust working hours etc.), and reasons for non-participation. A employer marketing log should be kept for each employer contacted. An example of an employer marketing log is shown in Figure 3.4, excerpted from Carmichael-Lynch's Marketing Report (11). Two information items should be added to this form, one to register total number of employees and type of business (c.f. Table 3.2) and the other requesting reasons for non-participation (if any).

If an initial marketing contact is not successful, that is if the employer does not choose to participate, an attempt should nonetheless be made to determine employment size and type and management's reasons for non-participation. How this data is collected will depend on the nature of employer contacts. If employers are contacted solely by mail, a follow-up letter will be necessary. If employers are contacted by telephone, the required information can be requested directly. Reasons for non-participation will be open-ended responses. If written responses are received, they should be included as an attachment to the employers' marketing log. If contact is made by telephone, the CS representative should attempt to record employers' comments verbatim.

Summary information on employer marketing efforts can be summarized on the form shown in Figure 3.5 (also excerpted from (11). One summary form

## EMPLOYER MARKETING RESULTS

1. _____ _____ _____
   (Name of Firm) (Address) (Phone #)

2. _____
   (Chief Executive Officer)

3. _____
   (Person Contacted)

4. _____ _____ _____
   (Persons at First Meeting)

5. _____ _____
   (Company Coordintor) (Phone #)

| | Support | | | | | |
|---|---|---|---|---|---|---|
| | First Meeting | | | Second Meeting | | |
| | Yes | Maybe | No | Yes | Maybe | No |
| Appoint Coordinator | | | | | | |
| Distribute Survey | | | | | | |
| Employees' Names & Addresses | | | | | | |
| Adjust Working Hours | | | | | | |
| Preferential Parking | | | | | | |
| Financial Contribution | | | | | | |
| Marketing to Employees | | | | | | |
| Co. Newsletter | | | | | | |
| Paycheck Stuffers | | | | | | |
| Posters | | | | | | |
| Place & Time for Meetings | | | | | | |
| Release Employees | | | | | | |
| Notify New Employees | | | | | | |
| Recognition Program | | | | | | |

FIGURE 3.4 EXAMPLE OF EMPLOYER MARKETING LOG



Source (11)

SUMMARY OF EMPLOYER MARKETING RESULTS

| | Solicitation | | | First Meetings | | | | Second Meetings | | | | Supports | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Total Employers Approached | Personal Intro. | Letter | Total | Flip Chart | A/V Presen. | Employer Guide | Total | Flip Chart | A/V Presen. | Employer Guide | First Meeting Total | First Meeting Distr. of Survey | First Meeting Names, Addresses | First Meeting $ | Second Meeting Total | Second Meeting Distr. of Survey | Second Meeting Names, Addresses | Second Meeting $ |
| Total | | | | | | | | | | | | | | | | | | | |
| 50 Employees | | | | | | | | | | | | | | | | | | | |
| 50-100 Employees | | | | | | | | | | | | | | | | | | | |
| 101-250 Employees | | | | | | | | | | | | | | | | | | | |
| 250 Employees | | | | | | | | | | | | | | | | | | | |

FIGURE 3.5 EMPLOYER MARKETING SUMMARY DATA FORM

Source: (11)

should be maintained for each demonstration site with data stratified by employer size. The size stratifications shown in the figure may be too coarse, particularly at the low end. At the Pentagon Park site for example, over 85% of the firms employ less than 25 employers. Copies of both employer marketing logs and summary-data forms for each site should be made available to the evaluation contractor when primary marketing activities are completed.

## 3.4 PRELIMINARY TRAVEL SURVEYS

The primary uses of these data are:

a. to provide basic data on potential market for ridesharing

b. to provide benchmark data on current travel patterns and market demographics.

The current plan is to distribute a set of relatively short (one page) travel surveys to all participating employers for distribution to their employees. Thus, the companies will act as the distributors and collectors of the survey forms. Not only does this serve to decrease collection costs, but employer participation/cooperation tends to yield extremely high return rates. Commuter Services has distributed the travel survey shown previously in Figure 1.2 to three large firms in the southcentral Minneapolis demonstration site and received return rate of as high as 86% (see Section 1. 4.3)

It is recommended that for all future distribution of the preliminary travel surveys, the forms should be revised by adding questions pertaining to auto occupancy, carpool composition, frequency of modal use, auto ownership, and respondent sex. The importance of obtaining each of these data items is described briefly below.

### 3.4.1 Frequency of Modal Use

Past studies have shown that ridesharing participation is usually not an everyday commitment, and therefore to be successful ridesharing programs

should not require such participation. Several recent surveys taken in the Boston area, for example (2) suggest that upwards of 40% of all carpoolers use alternative modes to work at least once a week. Gaining knowledge on this aspect of work commuting is important both for establishing potential carpool/vanpool matches and for evaluating the impacts of the demonstration project.

### 3.4.2 Vehicle Occupancy

One of the key measures of effectiveness of the demonstration is the resulting increase in ridesharing. This can be measured by average vehicle occupancy.* In order to form a benchmark for comparison of post demonstration vehicle occupancies, an accurate measure of current vehicle occupancy is required. This can be obtained in one of two ways: by observation at parking lot sites or by estimation from survey sources. Taking an inventory at parking lot sites has the problem of being difficult and costly to administer, particularly at sites where employee parking is spread over many lots and on-street areas. Moreover, inventory counts cannot easily distinguish between employee vehicles and visitor vehicles, and thus accurate work trip average auto occupancy levels may be difficult if not impossible to obtain.**

Given that an employment-based travel survey will be administered in any event, vehicle occupancy levels can be obtained from the survey at virtually no extra cost. Sampling errors should be extremely small, given the high return rate and relatively large employee population. For example,

*For example, measures 6.13 and 6.14 in Table 2.5

**In isolated instances, vehicle counts would be relatively straightforward, e.g., at Honeywell's garage structure which has only three entrances. However at other locations, particularly the smaller businesses in the S.C. Minneapolis site with some lot and on-street parking, vehicle counts would be extremely difficult. There are other advantages of determining vehicle occupancy by survey besides relative ease of collection; see following text.

assuming a 70% return rate on surveys distributed to the 7700 employees in south central Minneapolis, the sampling error (standard deviation) associated with a prediction of 70% of all vehicle trips being drive-alone trips would be less than 1% of the mean.* Adding a vehicle-occupancy question to the survey has the added advantage that baseline-vehicle-occupancy figures can be analyzed as a function of work-trip distance, company size, or any other demographic variable in the travel survey.

### 3.4.3 Carpool Composition

This variable would indicate what type of ridesharing arrangements are currently being employed by workers at the multi-employer demonstration sites. Categories of ridesharing include:

ride with family
ride with co-workers (same company)
ride with friends who work elsewhere.

Respondents could check off more than one category. This question should be asked in addition to the previously discussed item on vehicle occupancy and the question already included on the survey dealing with mode choice.

### 3.4.4 Sex of the Respondent

Experience with ridesharing programs in Massachusetts and elsewhere suggests that females often have a higher propensity to carpool/vanpool than males because of limited auto availability in single auto, multiple-worker households. In any event, it will be useful to explore whether a discernible

*An implicit assumption in the above calculation of sampling error is that the sample is unbiased, i.e., that the commuting patterns of those workers returning surveys is no different than non-returns. This assumption may be checked by comparing reported trip behavior from the ridesharing applications (see next section). We can take a sample of workers who returned a ridesharing application but did not return a preliminary survey and compare their work mode choices to preliminary-survey results.

TRAVEL SURVEY

In order to overcome some of the problems associated with commuting to and from work, we want to know more about your commuting patterns and habits. Your answers to the following questions will help us do so; the data will be used for not other purpose. We ask that you fill out this questionnaire and return it to your supervisor as quickly as possible. Thank you. (PLEASE PRINT)

---

My name is: (8-23) Last Name ☐☐☐☐☐☐☐☐☐☐☐☐☐☐☐ (24-32) First Name ☐☐☐☐☐☐☐☐☐ (33) Middle Initial ☐

My home address is: (34-39) Street Number ☐☐☐☐☐☐ (40-56) Street Name ☐☐☐☐☐☐☐☐☐☐☐☐☐☐☐☐☐

(57-74) Name of City or Suburb ☐☐☐☐☐☐☐☐☐☐☐☐☐☐☐☐☐☐ (75-79) Zip Code ☐☐☐☐☐ (80) ☐1

---

I am employed by: _____
Name of Firm

My work telephone # is: (8-10) ☐☐☐ - (11-14) ☐☐☐☐ My work starts at: (15-18) ☐☐:☐☐ (19-20) AM or PM ☐☐ (for example, ☐8:00 AM)
(nearest ¼ hour)

I normally work these days, not including overtime: (please mark X) (21-27) ☐MO ☐TU ☐WE ☐TH ☐FR ☐SA ☐SU

My work ends at: (28-31) ☐☐:☐☐ (nearest ¼ hour) (32-33) ☐☐ AM or PM (80) ☐2

---

I work (mark X): (8) ☐ Full Time (9) ☐ Part Time (10) ☐ Seasonal

I work a rotating shift: (11) ☐ Yes (12) ☐ No

I usually work overtime: (13) ☐ Less than 1 day per week (14) ☐ 1-2 days per week (15) ☐ 3 or more days per week

I need a car for business: (16) ☐ Less than 1 day per week (17) ☐ 1-2 days per week (18) ☐ 3 or more days per week

I usually travel to and from work by: (mark X in only one)

(19) ☐ Drive Alone
(20) ☐ Carpool*-ride
(21) ☐ Carpool*-drive
(22) ☐ Carpool*-share driving with others
(23) ☐ Vanpool
(24) ☐ Dropped off by someone
(25) ☐ Bus
(26) ☐ Other-(walk, taxi, motorcycle, bicycle, etc.)

*Carpool is two or more people, including the driver.

In a typical week, how many days do you use this mode to get to and from work? (Please mark X) ☐1 ☐2 ☐3 ☐4 ☐5 or more

If you usually use a car or van to work as a driver or passenger, how many people (including yourself) ride in the vehicle? (Please mark X) ☐1 ☐2 ☐3 ☐4 ☐5 ☐6 or more

If you carpool or vanpool, who do you usually ride with? (Please mark one or more of the statements below with an X)

☐ ride with other family members
☐ ride with co-workers (same company)
☐ ride with friends who work elsewhere

What is your sex? (Please mark X) ☐ male ☐ female

How many automobiles (including vans and pickups) are owned or leased by your household? (Please mark X) ☐1 ☐2 ☐3 ☐4 or more

My home telephone number is: ☐☐☐ - ☐☐☐☐

My employee mail station number is: ☐☐☐☐ ☐☐☐☐ (80) ☐3

FIGURE 3.6 REVISED EMPLOYEE PRELIMINARY TRAVEL SURVEY

difference in travel behavior between males and females is observable. Although the employee is currently asked to fill in his or her name on the current version of the travel survey, this information will not be machine-translatable to sex. A question on respondent sex should be added to the survey.

### 3.4.5 Auto Ownership

This variable is important for two reasons. First, it will serve to identify likely candidates for the ridesharing program. Secondly, it will provide baseline figures from which any changes in household auto ownership as a result of the demonstration can be established.

A revised version of the questionnaire showing the placement of the five additional questions discussed above is shown in Figure 3.6. Some re-arrangement or photoreduction of the questionnaire form will be required to get all the questions on one page. Note that on the question related to work mode choice, we have eliminated the word "everyday" since it is incongruous to ask respondents if they usually carpool - ride or drive everyday. The recommended additions to the questionnaire require 20 computer-card columns, less than the 39 available spaces on the third card of the coded responses.

Other data items that were considered for inclusion on the initial travel survey but omitted due to questionnaire-length considerations are briefly discussed in the following paragraphs.

### 3.4.6 Number of Household Workers

This factor has been found to be important in influencing household auto ownership and work-mode-choice decisions. However, because questionnaire-length considerations are critical, we can probably defer collection of this data item until follow-up surveys later in the demonstration. To avoid ambiguity, the

questionnaire should specify that only full-time workers (30 hours per week or more) should be counted.

### 3.4.7 Employment Type

Collection of this data category can be deferred till after the carpool/vanpool/subscription buses are in operation. Basically, the hypotheses of interest are:

does employment type affect the propensity to ride share?

would employees in different job categories (e.g., management and assembly line worker) "mix" in the same carpool or vanpool?

The latter question can be addressed by keeping track of ridesharing formations (as discussed in Section 3.6). As for the former question, recent experience in Massachusetts indicates that type of company (e.g., insurance vs. manufacturing) may be greatly more significant than job type in affecting ridesharing propensity.

The basic problem with collecting employment type data is that it is extremely difficult to come up with a close-ended categorization on the questionnaire that "makes sense" across several different companies. In previous survey efforts administered by Cambridge Systematics, we have used two descriptors, job title and job description. It appears that neither category alone is sufficient to get adequate data. Job title alone has the classic problem of having a garbage collector respond that she/he is a sanitary engineer. Job description alone also has problems: both the president and the secretary of an organization could define their job as "administrative." We have on occasion used open-ended questions, necessitating expensive recode operations. A careful review of alternative techniques to determine employment type will be undertaken so that appropriate questions can be included on the follow-up surveys.

### 3.4.8 Income

Although having income data for analysis would be useful, we recommend deferring collection of this data item until smaller sample follow-up surveys are administered. Including income on the initial surveys might reduce the return rate and would make survey administration more difficult (e.g., require completed surveys to be put in sealed envelopes to provide confidentiality).

As noted earlier, the Preliminary Travel Surveys will be a key data input to the "before" data analyses. The evaluation contractor will process returned survey forms in conjunction with level of service data provided by the Minnesota Department of Transportation.

## 3.5 APPLICATIONS FOR RIDESHARING SERVICES

A secondary source of "before" demonstration commuting patterns are the ridesharing applications distributed to employees at mass marketing sessions (see Figure 3.7). Employees interested in one or more of the CS services are asked to return a completed form. Thus, these data should give some indication of commuting patterns and preferences, at least for those commuters with an initial interest in ridesharing.* Importantly, certain key data items such as vehicle occupancy and frequency of carpool use, omitted from the Preliminary Travel Surveys, are included on the application form so that a fuller description of "before" commuting patterns can be established.

For the three firms where preliminary travel surveys have already been administered using the form shown in Figure 1.2, employee applications should be coded and keypunched so that commuting patterns can be fully analyzed.

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*At CDC-Magnetic Peripherals, nearly 80% of all employees attended marketing meetings, and 80% of these returned applications yielding a 64% sample.

## Yes, I am interested in Share A Ride

My name is: (8-23) Last Name ☐☐☐☐☐☐☐☐☐☐☐☐☐☐☐☐ (24-32) First Name ☐☐☐☐☐☐☐☐☐ (33) Middle Initial ☐

My home address is: (34-39) Street Number ☐☐☐☐☐☐ (40-56) Street Name ☐☐☐☐☐☐☐☐☐☐☐☐☐☐☐☐☐

(57-74) Name of City or Suburb you live in ☐☐☐☐☐☐☐☐☐☐☐☐☐☐☐☐☐☐ (75-79) Zip Code ☐☐☐☐☐

I am employed by: _____
Name of Firm and Address

My work telephone # is: (8-10) (11-14) ☐☐☐☐☐☐☐

My work starts at: (nearest ¼ hour) (15-18) ☐☐☐☐ (19-20) ☐☐ AM or PM (for example) 0830 AM

I normally work these days, not including overtime: (please mark X) (21-27) ☐ MO ☐ TU ☐ WE ☐ TH ☐ FR ☐ SA ☐ SU

My work ends at: (nearest ¼ hour) (28-31) ☐☐☐☐ (32-33) ☐☐ AM or PM

Please contact me about ☐ Car Pools, ☐ Van Pools, ☐ Regular Bus Services, ☐ Custom Buses. (Check appropriate boxes. Circle your first preference.)

I now drive alone ☐, am a Car Pool rider ☐, Car Pool driver ☐. (Current Car Poolers, see reverse side)

## For current car poolers only

1. How many are in your Car Pool, including yourself (please mark x) ☐2 ☐3 ☐4 ☐5
2. Names of other Car Pool members:

   _____

   _____

   _____

   _____
3. In a typical week, how many days do you Car Pool to get to and from work: (please mark x)
   ☐1 ☐2 ☐3 ☐4 ☐5
4. Do you (please mark x):
   - ☐ Drive every day
   - ☐ Ride every day
   - ☐ Share driving with others
5. Would you be willing to take more Car Pool members in your Car Pool? ☐ Yes ☐ No

FIGURE 3.7 EMPLOYEE RIDESHARING APPLICATION FORM

It was originally planned to perform carpool and vanpool matching by computer, so that these forms would be keypunched in any event.*

For employee application forms distributed after revised Preliminary Travel Surveys (see Figure 3.6) have been administered (coded and keypunched), processing of employee applications can be manual. Important data to be tabulated using these forms are given by measures 1.12 and 1.13 in Table 2.2. At each site, CS should prepare Master File summary tabulations at four intervals, that is, when 25, 50, 75 and 100% of the site's work force has been contacted and/or attended marketing sessions. In addition to the desired summary measures indicated above, CS should include tabulations of the numbers of commuters falling in the various active and inactive pool status categories (for example, "interested," "tentative," "hold," and "pooled").

It should be noted that the current form (Figure 3.7) does not have bus as a response category on the question dealing with current mode choice. This omission should be rectified before any further distribution of the form is made.

*Due to early problems with the MNDOT computer programs, CDC employee matching is being done by hand by MTC's area office and VSI.

## 3.6 SURVEYS

Employee and employer surveys will be used as the basic data collection technique to measure the quantitative impacts of the demonstration. There are three basic survey elements to be administered although within each element there will be several different types of questionnaires. The basic data collection elements are *employee follow up surveys, ridesharing supplementary surveys and driving logs, and employer surveys*. Each of these survey elements is discussed below in turn.

### 3.6.1 Employer Follow-Up Surveys

These surveys will be the basic instrument in ascertaining demand shifts, socio-economic characteristics of the commuting population, effectiveness of the marketing program (as measured by consumer awareness), perceived level of service shifts and worker attitudes towards qualitative characteristics of alternative modes. For specific measures to be derived using employer follow-up surveys, reference can be made to Tables 2.1 - 2.9.

3.6.1.1 Issues in Employer-based Survey Design, Administration, and Timing - A major use of the survey will be the determination of the current (at the time of the survey) mode choice of commuters, and what modes were used before the start of the demonstration. There are five modes to be considered:

drive alone

carpool

regular bus

vanpool

custom bus

Ridership levels for vanpools and custom bus services can be easily determined from monthly revenue and expense reports (see Section 3.7). Ridership on the

remaining three modes however, is not as directly ascertainable.

Bus patronage can be determined from on board administered surveys, bus stop mailback surveys or bus patron counts. The problem with on-board administered surveys is that most of the routes (for example the Freeway Flyers serving S.C. Minneapolis) serving the demonstration sites pass through the areas. As a result, many of the bus patrons are not destined to study areas.

A more efficient means of reaching bus-commuting employees from the demonstration areas would be to distribute questionnaires at bus stops in and adjacent to the demonstration sites. Bus patrons found at these bus stops are most likely originating (or destined) to the demonstration area, and a screener question asked before handing out the survey (or an initial question on the questionnaire) would limit the survey returns to employees from the demonstration sites.* The major drawback of this data collection technique compared to administered on-board surveys is that it probably will yield a lower questionnaire return rate.

Unlike the previous modal demands, determining the demand patterns of drive alone and carpooling commuters cannot effectively be determined from vehicle-based surveys (c.f., on-board surveys, samples generated from vanpool monthly revenue statements). This leads to the requirement for an employer-based survey as the basic instrument for determining demand shifts for all modes. Section 3.6.2 will discuss the need for vehicle-based surveys to provide detailed information on the ridesharing modes. However, the basic source of modal split and demand shift data will be from a random employer-based survey.

*It is considered beyond the scope of this demonstration to evaluate total ridership changes on bus routes (i.e., including riders who are not employed at an establishment within the demonstration area boundaries (see Figure 1.1)).

There are two basic procedures that may be employed to administer the follow-up survey: by telephone or as a self-administered survey (with respondents filling out the form at home). The key factor in determining which survey administration technique to use relates to the availability of information on the appropriate survey base. If, for example, an employment-based reverse telephone directory is available for the three demonstration sites, telephone interviewing would be the most efficient means of randomly sampling demonstration area employees. If, on the other hand, complete listing (with home telephone numbers) of employees at the sites is not available, it will be difficult if not impossible to reach a random sample of employees with a telephone survey. In this case, it will be more efficient to randomly sample firms*, requesting all employees in small firms and a sample of employees in large firms to fill out a questionnaire.

Regardless of how the survey is administered, it is anticipated that the survey will take approximately 30 minutes, gathering information on the items summarized in Table 3.3. One employee follow-up survey will be administered at each demonstration site. The timing of these surveys reflects a compromise between allowing sufficient time for demonstration "maturation" and allowing sufficient time for data reduction and analysis. The recommended schedule for survey administration is discussed in Section 3.8.

3.6.1.2 Issues in Sample Design for Employer-based Surveys - Two key issues must be resolved in designing a statistically sound sample for the employee follow-up surveys. First, a sample size large enough to make reasonably confident conclusions on demand shifts needs to be determined. Second, a sampling procedure must be determined which yields a sample representative

*An inventory of firms by employment size will be available.

TABLE 3.3 DATA ITEMS IN EMPLOYER-BASED FOLLOW-UP SURVEY

Employee Characteristics

age

sex

household income

household size

number of workers

number of licensed drivers

number of household autos (now)

number of household autos (before demo)

occupation

work site and location

number of years working at current site

Work Characteristics

working hours

overtime requirements

business use of car

Mode Choice Data

current mode choice

previous mode choice

how long current choice used

Perceived Level of Service Data

perceived and measured travel time

perceived and measured travel cost

perceived and measured travel distance

Awareness of Commuter Services/Effectiveness of Marketing

is commuter aware of demo

did commuter attend mktg. mtg.

did commuter apply for ridesharing

method commuter first heard of demo

Attitudes Towards Qualitative Factors

attitudinally scaled measures of convenience, privacy, safety, reliability of alternative modes.

of the commuting population as a whole.

Survey sample sizes will be based on requiring a 99% confidence level for estimates of the true proportion of the sampled population within ± 10% of the total population. The sample size may be determined from (15):

$$n = \frac{\frac{z^2_{.99}\, pq}{d^2}}{\left(1 + \frac{1}{N}\left(\frac{z^2_{.99}\, pq}{d^2} - 1\right)\right)}$$

where n = required sample size, corrected for finite population

$z_{.99}$ = normal statistic corresponding to the (two-tailed) 99% confidence level

p = expected proportion

q = 1 - p

d = desired precision expressed as a fraction of the total

N = total population size.

Assuming the worst case (i.e. maximum sample size) of the expected proportion (of users of a particular mode for example) of p = q = .5 and N = $\infty$, yields a required sample size of 166. Actually, the finite population correction makes little difference for this application. The smallest site (Bloomington) has 3600 employees which reduces the above calculated sample size (166) by only 7 observations (159).

The second concern in sample design is choosing a representative sampling base. Clearly, sampling only through participating employers or large employers would, if uncorrected, yield biased survey results. Another possible source of bias would result if only certain types of employees were surveyed -- for example, only production workers in a firm with both production staff and engineers. To avoid these problems, the recommended sampling approach

employs a multistage sample where the first stage is based on a dichotomization classifying firms according to whether they have sponsored mass marketing meetings or not. All large firms who have sponsored mass marketing meetings (e.g. CDC, Sears, Honeywell) will be "forced" into the sample. Assuming employee name lists for these firms are available, sampling will simply consist of choosing every $i^{th}$ name from the list where i is the appropriate interval for the chosen sample size.*

The second level of the multistage sample will consist of dividing the remaining firms into two groups: those whose management has actively cooperated in the marketing efforts and those who have not. A sample of firms within each of these categories will be chosen based on firm size. Final stage sampling will be based on either sampling each individual worker in the smaller firms or a sample of these small firm workers depending on the ease in obtaining name lists of employees in the demonstration sites.

### 3.6.2 Ridesharing Supplementary Surveys and Travel Logs

These surveys and related data collection activities will be the primary source of information on level of service shifts including travel time and time reliability, vehicle operational characteristics, ridesharing participation stability and demographic characteristics of ridesharers. They are considered "supplementary" to the employee based survey in that they will enrich the number of ridesharing observations collected from the employer-based follow up surveys. The basic problem with relying on the employer-based survey as the sole source of information on ridesharers is that for some of the modes (e.g. regular bus serving Pentagon Park or custom bus at any of the sites), ridesharing demand may be so low that few if any ridesharing observations will be obtained.

*This way of sampling assures randomness across different employee categories.

This problem is illustrated in Table 3.4. The previous section suggested that a random employer based sample of 160 workers would yield an acceptable level of sampling variability. However, if overall ridership on (say) custom bus is only 1%*, the probability of obtaining more than 1 custom bus user in the sample would be less than 50%. As another example, Table 3.4 indicates that if vanpooling captured 2% of the commuting population,** a random sample of 160 employees would have only a 22% chance of including 5 or more van users.

3.6.2.1 Issues in Supplementary Survey Design, Administration, and Timing - From the standpoint of administration and survey design and timing, the supplementary surveys for vanpool and custom bus users are similar, and unless otherwise noted in the discussion below, the procedures to be used are identical. Supplementary surveys for regular bus patrons and carpoolers each have administrative singularities, and data collection activities for these modes will be discussed separately.

3.6.2.1.1 Vanpools and Custom Buses - These surveys will be similar in scope to the employer-based surveys (see Table 3.3). Basic information categories include user demographics, work characteristics, perceived level of service data, and attitudes towards qualitative characteristics of alternative modes. Because the current mode choice (i.e., vanpool or custom bus) will be known a priori in this case, some simplifications can be made in de-

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* For example, two custom buses (totalling 60 passengers) serving the Pentagon Park/Normandale site (6000 employees) would represent a 1% market share.

**This would represent 12 vans serving the Pentagon Park/Normandale site.

TABLE 3.4 PROBABILITY OF FINDING FEW OR NO RIDESHARERS IN RANDOM SAMPLE
(based on random sample of 160 observations)

| Aggregate Ridesharing Mode Share | Probability of 0 Observations | Probability of 1 or less | Probability of less than 5 |
|---|---|---|---|
| (percent) | | | (percent) |
| 0.5 | 0.45 | 0.81 | 1.00 * |
| 1 | 0.20 | 0.52 | 0.97 |
| 2 | 0.04 | 0.17 | 0.78 |

*Rounded to two significant digits

signing the skip patterns used in the questionnaires. For example, unlike the random employer-based survey, no questions need be asked about the respondents' current mode choice, or whether the respondent is aware of the demonstration. Some additional questions may be added specifically pertaining to these modes, such as reasons for becoming a vanpool (custom bus) rider (driver).

It is anticipated that the employer based random sample will be administered shortly before the vanpool and custom bus supplementary surveys (see Section 3.8). Consequently, care will be taken to avoid distributing supplementary surveys to individuals who have completed the employer based survey.

The surveys, like the employer based follow up surveys, will be self-administered. VSI will have complete information on the work and home addresses of all current vanpoolers and custom bus users. In fact, it is this list of rideshare users that will be used as the basis for choosing the respondant sample (see discussion in Section 3.6.2.2). Forms can be mailed directly to respondents' homes with instructions to mail them back to VSI or, alternatively, distribution and collection of forms can be coordinated through driver coordinators.

A related data collection effort for vanpools and custom buses concerns information on travel times, trip circuity and travel-time reliability. The first two items can be determined from a one-day trip log in which the clock time and mileage (odometer) reading could be noted at each passenger pickup point. Obtaining data on travel-time reliability requires that trip logs be completed over a number of days--one week (five days) probably being the minimum period to obtain useful data.

Logs would be started by the driver and completed by the first embarking passenger on inbound trips (to work) and last disembarking passenger on outbound trips. If the order of passenger pickup is fixed, only the first day's log need record distances. The logs could be included as an attachment to the supplementary surveys distributed to drivers.

3.6.2.1.2 Carpools - Because of its higher mode split, the need to supplement the employer based surveys with *carpool* surveys is not overly critical. And, in fact, administratively there are two considerations which make it difficult to implement a supplementary carpool survey. First, it will not be as straightforward to identify existing carpoolers; there is nothing analogous to the monthly revenue reports received from vanpool and custom bus drivers. Carpoolers can be identified by referring to preliminary travel surveys and/or the ridesharing applications (see Figure 3.7), choosing as candidates those who already carpool and those who applied for carpool formation assistance. Another method of identifying carpools is to have "spotters" posted at major parking locations within the demonstration sites handing out surveys to occupants of arriving vehicles with at least one passenger in addition to the driver.

A second factor that would differentiate the carpool supplementary data collection efforts from the vanpool/custom bus surveys is that trip log data would be administratively harder to collect. For one thing, many carpoolers may have no association or commitment to the Commuter Services demonstration*, and thus they may be less willing to complete weeklong logs. But more importantly, unlike in vans and custom buses, carpoolers

*That is, those whose carpool was formed by individual initiative before the inception of the demonstration.

may share driving responsibilities over the course of a week and thus two or more members of the carpool would have to cooperate in initiating and completing the log. As a result, we could anticipate a lower return rate for those questionnaires/logs in determining the number of forms to mail out (see Section 3.6.2.2).

In view of the above considerations, it is recommended that no supplementary carpool surveys be administered. Rather, we will rely on the employer based surveys to provide socioeconomic and attitudinal data on present or past carpoolers. It may be advantageous to slightly increase the sample size at those sites where carpooling rates are relatively low (e.g., South Central Minneapolis) in order to ensure suffucient carpool data.

As for carpool driving logs, we recommend that these be administered on a *voluntary* (non-sampling) basis. Through Commuter Services Newsletters, bulletin board notices or other means, CS could request carpoolers who were willing to keep a one week log (in return for a token reward) to contact their office. While this technique does not strictly provide a random sample of carpoolers, it has the advantage of simplifying the task of finding eligible, willing respondents. The resulting data could certainly be subjected to qualitative analyses.

3.6.2.1.3 Regular Buses - Although the survey of bus users is largely similar to the other supplementary surveys, the method of identifying users and distributing surveys differs. This has already been discussed on page 3-23. Field staff will distribute surveys at selected bus stops adjacent to and within the three demonstration sites. This should preferably be done in the afternoon peak, since it will be easier to ask screener questions* in the afternoon when respondents will be waiting at the bus

* Respondents will be asked whether they are workers at an establishment within the demonstration area before being given a questionnaire.

stops.

3.6.2.2 Issues in Sample Design for Supplementary Surveys - No supplementary surveying of drive-alone or carpool commuters is envisioned since it is felt that the employer bases survey will yield sufficient data. For the three modes requiring supplementary surveys, sample sizes can be determined a priori using the relationship presented on page 3-26. For these surveys, sample sizes will be based on the total ridesharing population at all three sites combined.

There is, of course, some uncertainty in determining the appropriate sample size since it is not now known what the ultimate demands for the alternative ridesharing services will be. In the calculations below, therefore, we have made somewhat optimistic assumptions on ridesharing demand*, and assumed the "worst case" situation of requiring the sample to allow with 99% confidence, predictions within $\pm$ 10% of an expected proportion of .50.

The sample sizes recommended are:

Vanpools

Assumed demand: 50 10 passenger vans = 50 drivers, 450 pass.
n(drivers) = 50
n(passengers) = 121

Custom Bus

Assumed demand: 6 30 passenger buses = 174 pass.
n(drivers) = 6
n(passengers) = 85

Carpool (voluntary carpool logs)

Assumed demand: 30% of all person trips = 5190 carpoolers
n = 166 (assuming an average carpool occupancy of 2.6, this represents 64 carpools)

Regular Bus

Assumed demand: 1250 passengers
n = 147

*Which has the effect of increasing required sample size.

It should be noted that for vanpool surveys, all drivers will receive questionnaires. Their responses are particularly critical since the one-week vehicle logs are included as part of their surveys.

With the exception of the regular bus surveys, all supplementary ridesharing surveys will be of the mail-out, mail-back variety. Assuming a return rate of approximately 30%, all custom bus and nearly all vanpool passengers would have to receive surveys in order to meet our pre-determined sample sizes.

As discussed earlier, the bus survey will be distributed at selected bus stops serving the demonstration areas. Assuming a 30% return rate, a total of 368 surveys should be distributed. We expect that distribution of the surveys could be handled by two surveyors working a total of 6 afternoons (3 days each).

With the relatively small sample sizes being used, non-response bias has the potential of affecting the results perhaps more strongly than in larger surveys with wider distribution. However, the presence of the preliminary travel surveys and the ridesharing applications will allow us to compare the socioeconomic characteristics of all target group survey respondents to target group users and thus identify any significant discrepancies in response rate over the sample. Additional surveys can then be taken (or "reminder" surveys sent to non-responders to the first wave survey) of individuals with under-reported characteristics.

3.6.3. Employer Surveys

These surveys will be the primary input for information on employer perceptions of the marketing efforts, motivations for participation/non-participation, and measures associated with impacts on employee performance (see Table 2.9). This information can probably best be obtained from a written evaluation form. The questionnaire should ask for

both objective and subjective measures of effectiveness of the demonstration as perceived by the employer. Objective measures include effect on employee absenteeism and on-time arrival, reduction in parking needs and possible increases in productivity.

Questionnaires can be sent directly to the established liaison officers at participating companies. For the purposes of this survey, it will probably be sufficient to send out the following number of evaluation forms at each demonstration site:

| Size of establishment | Number of forms distributed |
|---|---|
| 500 or more | All such establishments |
| 100 - 500 | 5 - 10 or all whichever is smaller |
| 0 - 100 | 20 - 30 |

Completed forms can be mailed directly back to Commuter Services.

### 3.6.4 Agency Responsibility in Administering Surveys

Table 3.5 summarizes the respective responsibilities of the evaluation contractor and Commuter Services in carrying out the survey activities discussed in the previous sections. Basically, Cambridge Systematics, the evaluation contractor, will be responsible for the initial design of all surveys including specification of the sample, questionnaire, and administrative details. Pre-tests of preliminary survey instruments will be the joint responsibility of Cambridge Systematics and Commuter Services. An informal procedure is envisaged; each survey will be distributed to 5-9 trial respondents. Each respondent will be asked how long it took to complete the survey as well as whether any questions were unclear or ambiguous.

Survey administration, coding, and keypunching of the survey results will be the responsibility of Commuter Services. Final data reduction and analysis will be handled by Cambridge Systematics.

TABLE 3.5 AGENCY RESPONSIBILITY IN ADMINISTERING SURVEYS*

| Activity | Agency Responsible |
|---|---|
| Sample Design | Evaluation Contractor |
| Preliminary Survey Design | Evaluation Contractor |
| Pre-test | Evaluation Contractor and Commuter Services |
| Final Survey Design | Evaluation Contractor |
| Survey Form Printing | Commuter Services |
| Final Design of Administrative Procedures | Evaluation Contractor and Commuter Services |
| Survey Administration | Commuter Services |
| Questionnaire Editing/Coding | Commuter Services |
| Keypunching | Commuter Services |
| Data Reduction/Analysis | Evaluation Contractor |

* "Commuter Services" will be used whenever responsibility falls on any of its member groups: MTC, PSO or VSI. In some instances, CS may wish to hire outside staff to perform certain tasks

## 3.7 OPERATING DATA AND FINANCIAL REPORTS

Data items in this category will provide information on ridesharing vehicle productivities, economics and financing. Monthly "Revenue and Expense Reports" for vanpools (and custom buses when service is initiated) will be a basic source of information on ridership, revenue, operating expenses and discretionary driver mileage (see Figure 3.8). Maintenance logs indicating periodic (preventative) maintenance activities and expenses should be maintained for each van, as should reports on accidents.

Costs data on the vanpool and custom bus program will be determined from VSI and MTC records. Costs should be broken out by:

capital costs (leasing cost for vehicle use)

fixed operating costs (insurance, title, taxes, licensing fees, etc.)

variable operating costs (fuel, tires maintenance)

administrative costs (costs of maintaining site office, costs of marketing, record keeping, other administrative functions).

For comparative analysis to the vanpool and custom bus services, MTC data will be examined to determine costs of providing regular bus service.

## 3.8 SCHEDULE OF DATA COLLECTION ACTIVITIES

Figure 3.9 depicts the schedule for the major data collection activities planned for the evaluation. Monthly revenue and expense reports and other continuous data collection activities are not shown in the figure for clarity purposes.

It should be stressed that the schedule presented here is extremely tentative, being based on the anticipated demonstration project schedule. Major slippages, or a reorientation of the project schedule would of course result in corresponding changes in the schedule of data collection activities.

Some of the data collection activities are dependent on one another.

VAN POOL SERVICES INC.
MINNEAPOLIS MINNESOTA

REVENUE AND EXPENSE REPORT

VAN POOL #

DAILY RT MILES X 21 = MILES PER MONTH

DRIVER/COORDINATOR

DATE FROM TO

WORK PHONE

EMPLOYER NAME

VAN POOL RECEIPTS

| PASSENGER NAME | REMARKS | AMOUNT | |
|---|---|---|---|
| 1. | | | |
| 2. | | | |
| 3. | | | |
| 4. | | | |
| 5. | | | |
| 6. | | | |
| 7. | | | |
| 8. | | | |
| 9. | | | |
| 10. | | | |
| 11. | | | |
| | TOTAL PASSENGER REVENUE | | |
| | TOTAL VAN POOL COST | | |
| | INCENTIVE ALLOWANCE/(DEFICIT) | | |
| | DRIVER INCENTIVE (50% OF INCENTIVE ALLOW) | | |

| VAN POOL COST | |
|---|---|
| FIXED EXPENSE | |
| OPERATING EXP. MPM X .10 | |
| TOTAL VAN POOL COST | |

| MILEAGE | |
|---|---|
| ENDING | |
| BEGINNING | |
| TOTAL | |
| LESS COMMUTE MPM | |
| PERSONAL MILEAGE | |
| LESS PM ALLOWED @ N.C. | -250 |
| EXCESS MILES | |
| EM @ .08 PER MILE | $ |

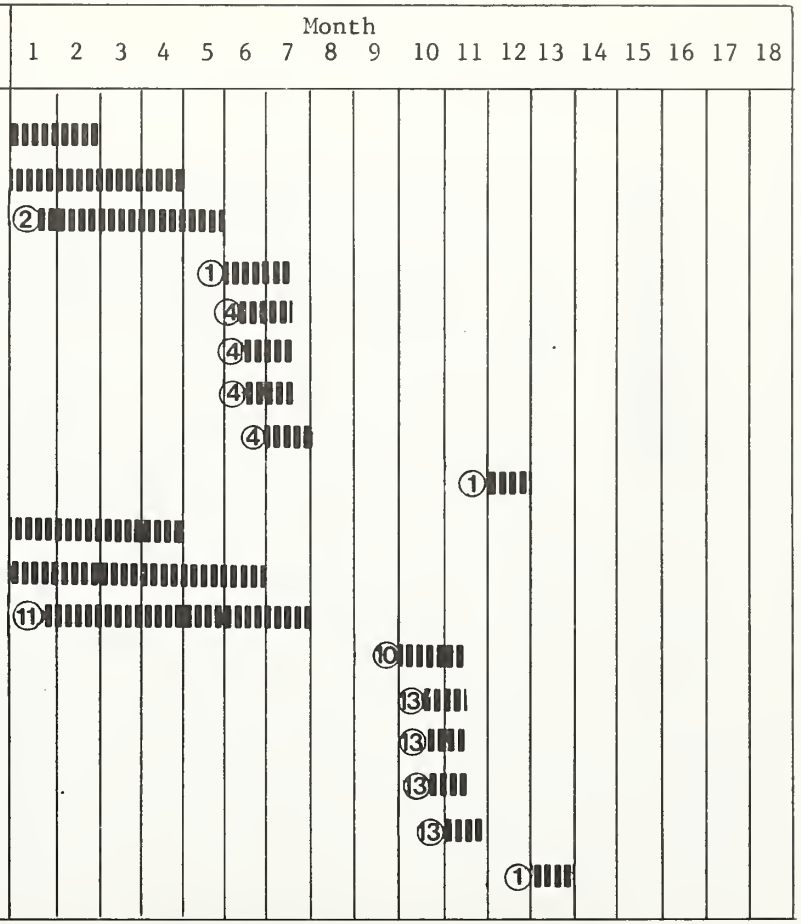
| VAN POOL EXPENSE | | |
|---|---|---|
| GAS MPM X .065 | | |
| WASH & CLN. MPM X .005 | | |
| MISC. EXPENSE | | |
| DRIVER EXPENSE | | |
| DRIVER INCENTIVE | | |
| TOTAL | | |
| EXCESS MILEAGE CHARGE | | |
| TOTAL EXP. DUE DRIVER | | |

DRIVER/COORD. SIGNATURE DATE

VAN POOL SERVICES, INC. DATE

FIGURE 3.8 VANPOOL REVENUE AND EXPENSE REPORTS

| Ref. # | Activity |
|---|---|
| 1 | Inventory of firms, site 1 |
| 2 | Preliminary travel surveys, site 1 |
| 3 | Applications for ridesharing, site 1 |
| 4 | Followup employee-based surveys, site 1 |
| 5 | Carpool supplementary survey, site 1 |
| 6 | Vanpool supplementary survey, site 1 |
| 7 | Custom bus supplementary survey, site 1 |
| 8 | Regular bus supplementary survey, site 1 |
| 9 | Employer survey, site 1 |
| 10 | Inventory of firms, site 2 |
| 11 | Preliminary travel surveys, site 2 |
| 12 | Applications for ridesharing, site 2 |
| 13 | Followup employee-based surveys, site 2 |
| 14 | Carpool supplementary survey, site 2 |
| 15 | Vanpool supplementary survey, site 2 |
| 16 | Custom bus supplementary survey, site 2 |
| 17 | Regular bus supplementary survey, site 2 |
| 18 | Employer survey, site 2 |




Notes: Month 1 refers to January 1978, Month 18 refers to June 1979.
(i) indicates that the data collection item depends on the completion of (an element of) item i
Site 1 refers to Pentagon Park/Normandale
Site 2 refers to South Central Minneapolis
Site 3 refers to Central Bloomington

FIGURE 3.9 SCHEDULE OF DATA COLLECTION ACTIVITIES

| Ref. # | Activity | Month 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 |
|---|---|---|
| 19 | Inventory of firms, site 3 | |
| 20 | Preliminary travel surveys, site 3 | |
| 21 | Applications for ridesharing, site 3 | |
| 22 | Followup employee-based surveys, site 3 | |
| 23 | Carpool supplementary survey, site 3 | |
| 24 | Vanpool supplementary survey, site 3 | |
| 25 | Custom bus supplementary survey, site 3 | |
| 26 | Regular bus supplementary survey, site 3 | |
| 27 | Employer survey, site 3 | |



FIGURE 3.9, continued

For example, administering the employer-based follow-up surveys will require a completed inventory of firms by employment size.* In cases where the start of one collection activity is conditional on completion of another, this is indicated in Figure 3.9 by placing the reference number of the prerequisite data collection item at the start of the time line for the latter collection activity.

There is a tradeoff inherent in developing such a schedule between desiring to postpone survey administration as long as possible (to allow ridership patterns to stabilize) on the one hand, and allowing enough time for careful data reduction and analysis on the other. In this case, we adopted the following guidelines: "during" demonstration, surveys would have to be administered no sooner than six months following initiation of demonstration site marketing and no later than three months before the scheduled termination of the evaluation. Thus, for this eighteen-month evaluation period, there is approximately a nine-month "window" for survey information.

*See Section 3.6.1.2.

# 4. ANALYSIS STRATEGY

This section will briefly outline the analysis strategy to be used in this evaluation project. The detailed nature of the evaluation of the Minneapolis ridesharing demonstration and the large number of evaluation measures which emerge (see Section 2.3) lead to a complex analytical structure that can only be specified in general terms at this point. Since the demonstration is just now entering into the phase of initiating ridesharing services and collecting data, it is not practical to structure a detailed series of tests.

Rather, the discussion here will indicate the range of analytical procedures envisioned, the rationale for their use, and the possible limitations or problems that may be encountered.

The evaluation will consist of three basic elements: process descriptions, statistical analysis of evaluation measures, and model estimation and testing. The intent and nature of process descriptions has been discussed earlier in the Evaluation Plan. Basically, this element will be oriented toward other agencies who may be interested in initiating a ridesharing brokerage, and are interested in learning what procedures are adopted. It may be viewed as an *operations guide* focusing on a description of the administrative details of managing a brokerage, isolating problems and pitfalls that were encountered, and indicating how these problems were resolved. Quantitative descriptions will be limited to broad summary statistics.

The second evaluation element is designed to give a much more detailed quantitative understanding of *what* the demonstration's impacts were and to

a limited extent, based on inferences drawn from statistical tests, *why* these impacts occurred. First of all, the value and accuracy of each quantitative measure included in Tables 2.1 through 2.9 must be determined. For some data items, accuracy has both a pure statistical sampling variance and a (largely unknown) measurement error or bias. An example here would be reported vanpool travel times. This information will be sampled both in terms of being drawn from a limited number of days for a given vanpool and for a subset of the total number of vanpools. The sampling variance for the given sample can be easily determined. But the data also contain an element of variance due to measurement errors (different watches with different accuracies), reporting errors (e.g. the tendency to round up/down to the nearest five minutes), and coding errors. As a result, the sampling variance computed on reported data is probably an overestimate of the true underlying variance in the distribution of vanpool travel times and thus, statistical tests using these data will have a tendency not to reject null hypotheses.* In performing the evaluation, we will attempt to identify all cases where we feel the robustness of statistical tests may be weak due to measurement problems.

Beyond determining the value and accuracy of the evaluation measures, this quantitative element of the evaluation will make comparisons of specific variable groups across modal services and over time. Thus, for example, the levels of service of all ridesharing services and auto drive-alone can be contrasted. Similarly, demand, attitudes and user socioeconomic characteristics will be compared across modes and across demonstration sites. These

*For example, a null hypothesis that average circuity time is constant across vanpools with differing line haul commute distances.

are examples of static comparisons. As well, comparisons of specific variable groups can be made over time to examine trends in ridership, user attitudes and level of service shifts.

Statistical tests will be tailored to the specific structure of hypotheses: t-tests for differences in means, F-tests for differences in variances, and $\chi^2$-tests for tests of the independence of group stratifications.

The key demonstration issues to be investigated and specific measures to be used in performing statistical tests were identified in Section 2 of this Plan.

The final element of the evaluation concerns the development, estimation and testing of disaggregate models of work mode choice, incorporating as alternatives all of the ridesharing services. These models will aid in the understanding of why commuters make the choices that they do and how the choices might change in response to changes in operating policies (e.g. vanpool fares). Beyond serving as a learning tool, the models developed in this project will aid in forecasting the potential response to similar demonstrations implemented elsewhere.

The modelling approach will employ disaggregate logit choice formulation. These models have been presented elsewhere in detail (5, 14), and in fact have been developed to predict work mode choice behavior including the demand for ridesharing services (carpooling). Why, then, are we proposing to estimate new models?

First of all, relative to previous carpool modelling studies, we should have better data. These data will permit the development of more fully specified models and allow for the testing of specific hypotheses not previously investigated. Some of the modelling extensions include:

this evaluation will directly collect data on travel time reliability for carpooling and vanpooling. These data can be used to determine the extent to which time reliability affects demand.

the data will include detailed information of the working environment - working hours flexibility, occupation, overtime requirements, etc. To our knowledge, these variables have never been incorporated in a work mode choice model. To the extent that they are significant, the models will be well suited to predicting ridesharing demand in areas with widely different employment environments.

the models will represent the full range of ridesharing modes as choice alternatives. Previous work mode choice models have only included carpools (or "shared ride") as a choice alternative to auto drive alone and bus.

The evaluation will include estimation and validation of the mode choice models. In essence, the three demonstration sites provide three "data points" of ridership levels, employment environments and level of service conditions. Models will be estimated on data from one site and used to forecast on data from another site. If necessary, the models will be respecified to yield more accurate transferability forecasts. Ultimately, when the estimation process yields a model estimated on one site's data which reliably predicts demands at other sites, all the site data can be pooled to estimate one "master" model with decreased standard errors on the parameter estimates.

## 5. EVALUATION SCHEDULE

The evaluation project schedule is displayed in Figure 5.1. Analysis activities are keyed to the anticipated demonstration schedule (Figure 1.7) and data collection (particularly surveys) schedule (Figure 3.9).

As in the demonstration itself, the evaluation is "staggered" over the eighteen month period. The first eight months are predominantly concerned with evaluating the demonstration impacts at Pentagon Park/ Normandale (site 1). During this time, surveys will be administered and analyzed, leading to a site interim report in August, 1978.

The focus of the demonstration then shifts to the South Central Minneapolis site,* with the bulk of the survey activity occurring in the fall of 1978. An interim report on demonstration impacts at this site will be prepared in December, 1978.

Preliminary model estimation and testing will be performed in early 1979, using data from the first two sites. In this way, most of the analytical modelling will be completed before the heavy report writing period near the end of the demonstration.

Site 3 (Central Bloomington) will become the focus of the evaluation between October, 1978 and April, 1979. No interim report will be prepared for this site as the last three months of the evaluation will be devoted to final analyses of demonstration-wide data, final model estimation and testing, and writing of the final report.

---

* Of course certain data items (e.g., monthly revenue and expense reports for vanpool services) will be collected on a continuous basis.

| Activity | Period |
|---|---|
| Final Evaluation Plan Approved | January 1978 |
| Analysis of Pre-Demonstration Data, Site 1 | February-April 1978 |
| Sample, Survey Design, Employee Surveys, Site 1 | March-April 1978 |
| Survey Administration, Employee-based and Ridesharing Supplementary Surveys, Site 1 (Cooperative with Commuter Services) | May-June 1978 |
| Evaluation of Site 1 Operating Data and Financial Reports | Continuing |
| Analysis of Site 1 Survey Data | July 1978 |
| Site 1 Interim Evaluation Report | August 1978 |
| Analysis of Pre-Demonstration Data, Site 2 | June-July 1978 |
| Survey Administration, Employee-based and Ridesharing Supplementary Surveys, Site 2 (Cooperative with Commuter Services) | October-Nobember 1978 |
| Evaluation of Site 2 Operating Data and Financial Reports | Continuing |
| Analysis of Site 2 Survey Data | December 1978 |
| Site 2 Interim Evaluation Report | January 1979 |
| Site 1 Employer Surveys (Cooperative with Commuter Services) | December 1978 |
| Site 2 Employer Surveys (Cooperative with Commuter Services) | February 1979 |
| Model Estimation, Texting, Using Site 1/Site 2 Data | January-February 1979 |
| Analysis of Pre-Demonstration Data, Site 3 | October-November 1978 |

FIGURE 5.1 EVALUATION PROJECT SCHEDULE

| Activity | Period |
|---|---|
| Survey Administration, Employee-based and Ridesharing Supplementary Surveys, Site 3 (Cooperative with Commuter Services) | February-March 1979 |
| Site 3 Employer Surveys | March 1979 |
| Analysis of Site 3 Survey Data | April 1979 |
| Final Model Estimation, Texting, Using Full Data Set | April-May 1979 |
| Analysis of Operating Data and Financial Reports for All Three Sites | May 1979 |
| Analysis of Employer Surveys | May 1979 |
| Write Final Report | May-June 1979 |

FIGURE 5.1 (concluded)

# 6. DATA COLLECTION COSTS

In Chapter 3, it was noted that the data collection plan for the demonstration evaluation was designed to recognize and be largely consistent with data collection plans already scheduled by the grant recipient. One area that goes beyond the ongoing data collection plans of Commuter Services is the development and administration of the numerous surveys discussed in Section 3.6. Responsibility for the survey component of the evaluation will be divided between the evaluation contractor and the grant recipient. The evaluation contractor will be responsible for initial survey design, survey pretest, sample and sampling procedures design, development of coding and keypunching instructions, and final data reduction and analysis. The grant recipient will be responsible for assisting in a pre-test, assisting with the sample design and carrying out the actual sample selection, administration of the survey*, coding and keypunching the survey results and documenting the survey procedures.

It is anticipated that a professional market research firm will be engaged to conduct the required surveys. Figure 6.1 presents an estimate of resources required to carry out those elements of the survey research under the responsibility of the grant recipient and its subcontractor. Cost estimates included in the Figure are based on an assumed wage rate of $15 per hour for supervisory personnel and $4 per hour for coders, keypunchers and clerical personnel. These estimates have been made without consultation with organizations involved with administering the demonstration and hence must be viewed strictly as preliminary figures subject to review and revision.

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*Depending on the survey, this would involve personal distribution of surveys at the employment site, mailing out surveys, or handing out questionnaires at bus stops.

TABLE 6.1 DATA COLLECTION COSTS

| SURVEY | SAMPLE SIZE/EXPECTED RETURN RATE | SURVEY ELEMENT | SUPERVISORY HOURS | CLERICAL HOURS | COST |
|---|---|---|---|---|---|
| Employer based; work survey; site 1 | 165/30% | Pre-test[a] | 15 | 4 | $ 245 |
| | | Sample Selection[b] | 60 | 60 | 1,200 |
| | | Administration[c] | 5 | 15 | 150 |
| | | Coding[d] | 12 | 70 | 530 |
| | | Keypunching[e] | 4 | 25 | 185 |
| | | Documentation[f] | 16 | 4 | 260 |
| | | Total | 112 | 178 | $2,570 |
| Employer based worker survey sites 2 and 3 | 165 x 2/30% | Pre-test[a] | 0 | 0 | $ 0 |
| | | Sample Selection[b] | 120 | 120 | 2,400 |
| | | Administration[c] | 10 | 30 | 300 |
| | | Coding[g] | 16 | 120 | 840 |
| | | Keypunching[e] | 8 | 50 | 370 |
| | | Documentation[f] | 32 | 8 | 520 |
| | | Total | 186 | 328 | $4,430 |
| Vanpool supplementary survey | drivers:25/50% passengers: 121/30% | Pre-test[h] | 4 | 4 | $ 80 |
| | | Sample Selection[i] | 4 | 0 | 60 |
| | | Administration[i] | 0 | 4 | 20 |
| | | Coding[d] | 8 | 50 | 370 |
| | | Keypunching[e] | 4 | 20 | 160 |
| | | Documentation[f] | 12 | 4 | 200 |
| | | Total | 32 | 82 | $ 890 |
| Regular bus supplementary survey | 147/30% | Pre-test | 6 | 4 | $ 110 |
| | | Sample Selection[j] | 24 | 16 | 440 |
| | | Administration[k] | 12 | 48 | 420 |
| | | Coding[d] | 8 | 50 | 370 |
| | | Keypunching[e] | 4 | 20 | 160 |
| | | Documentation[f] | 16 | 4 | 260 |
| | | Total | 70 | 142 | $1,760 |

TABLE 6.1 DATA COLLECTION COSTS (concluded)

| SURVEY | SAMPLE SIZE/EXPECTED RETURN RATE | SURVEY ELEMENT | SUPERVISORY HOURS | CLERICAL HOURS | COST |
|---|---|---|---|---|---|
| Carpool logs (on volunteer basis) | 100/- | Pre-test[l] | 0 | 0 | $ 0 |
| | | Sample Selection[m] | 16 | 4 | 260 |
| | | Administration | 6 | 12 | 150 |
| | | Coding[d] | 4 | 16 | 140 |
| | | Keypunching[e] | 2 | 8 | 70 |
| | | Documentation[f] | 8 | 4 | 140 |
| | | Total | 36 | 44 | $ 760 |
| Employer surveys | large establishments (>500 employees) 7-8/100% | Pre-test[n] | 0 | 0 | $ 0 |
| | | Sample Selection | 12 | 4 | 200 |
| | medium size establishments (100-500 employees) 15-20/75% | Administration[o] | 30 | 10 | 500 |
| | | Coding[p] | 0 | 0 | 0 |
| | | Keypunching | 0 | 0 | 0 |
| | | Documentation[p] | 40 | 16 | 680 |
| | small establishments (<100 employees) 30-40/ 50% | Total | 82 | 30 | $1,380 |
| Total, all surveys | - | - | 518 | 804 | $11,790 |

See NOTES on following page.

NOTES:

a. Pre-test at first site involves administering draft questionnaire to five or six employees/acquaintances. Each employee should be "debriefed" after filling in the return. All comments should be syntehsized in a short memo indicating suggested changes. We assume pre-test will take three hours per return. No pre-test for other sites is envisioned since questionnaire will not change.

b. Sample Selection involves liaison work with administrative officers of establishments at the employment sites. Sampling procedure will require contacting an average of 40 firms to establish cooperation and distribute forms. Assume three hours per firm evenly divided between clerical and supervisory staff.

c. Administration involves picking up completed questionnaires and preparing for coding. Assume clerical work of one-half hour per firm.

d. Detailed coding instructions will be prepared by the evaluation contractor. Assume approximately three questionnaires per hour can be coded. Assume supervisor spends four hours of briefing and eight hours resolving clerical staff's questions.

e. Keypunchers can produce 20-40 punched and verified cards per hour. Assume each survey is tabulated on four cards.

f. Documentation involves a written report on specific coding of problems and resolutions, problems encountered in sample selection and administration.

g. Assuming same supervisory/clerical staff will work on coding questionnaires at all three sites, some reduction in briefing and coding times will be possible at second and third sites.

h. Pre-test of driver questionnaire and log can be administered to two to three actual van drivers. Since much of the questionnaire will be identical to employer based worker survey (see note a), pre-test debriefings of respondents will focus only on vanpool specific questions and driving logs.

i. Sample selection and administration handled through van drivers (i.e., distribution and collection of forms); hence, extremely low manpower requirements.

j. Sample Selection will require preparing a map of all bus stops/routes serving the demonstration sites and working with the evaluation contractor in developing an operational plan for distributing surveys.

k. Assumes two surveyors working three days each.

l. Will be similar to vanpool log, hence no pre-test is envisioned.

m. Cost estimate includes provision for a $2.00 "reward" for each volunteer carpool respondent.

n. The survey will be largely open-ended, with simply stated qualitative questions, hence, no pre-test is envisioned.

o. Based on making personal telephone calls to each establishment, one-half hour per call.

p. Coding and documentation will be by informal content analysis. We have allotted one person-week of supervisory time to write a short evaluative summary of the employer surveys. Evaluation contractor will supplement this effort.

Because of their experience, some of the survey activities may actually be best carried out (subject to time availability) by Commuter Services or MTC personnel. Included here are sample selection, particularly for the vanpool participants, and administration of the supplementary bus survey. The exact division of labor between MTC and external organizations remains to be determined.

Resources required from Commuter Services personnel for other elements in support of the evaluation are relatively minor. Most of the data requirements discussed in Chapter 3 are a direct outgrowth of ongoing Commuter Services recordkeeping functions. Exceptions that may be considered to be additional work include development of a type/size inventory of firms*, preparation of physical site descriptions and site maps, and the periodic tabulation of summary statistics on marketing activity. It is not anticipated that derivation of the data items cited above would require more than four person-weeks of professional effort by CS staff over the remaining 15 months of the demonstration. Over and above these specific tasks, however, the evaluation contractor will require periodic assistance from Commuter Services in supplying available data (e.g. vanpool revenue and expense reports, preliminary travel survey data, project cost data, and employer marketing logs).

*Actually, such an inventory would be developed in any event. The evaluation plan merely requests an industrial classification of establishment type be added to initial contact marketing logs.

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## APPENDIX: REPORT OF NEW TECHNOLOGY

A diligent review of the work performed under this contract has revealed no significant innovations, discoveries, or improvements of inventions at this time. In addition, all methodologies employed are available in the open literature.

The findings in this document will be useful in providing valuable insights to other agencies interested in performing a comprehensive evaluation of a demonstration project. Although the emphasis here is on evaluating a transportation project, the research approach and methodologies presented are generalizable to a wide range of projects. Major elements of the report which bear on performing a comprehensive evaluation include the development of measures of effectiveness of marketing efforts, techniques for measuring service changes and demand shifts, development of a survey research strategy and the specification of disaggregate models of work trip travel behavior.

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