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Automobile trip reduction strategies : an analysis of employer-based trip reduction programs

Jamie Jarvis
San Jose State University

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Jarvis, Jamie, M.S.

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300 N. Zeeb Rd.
Ann Arbor, MI 48106

AUTOMOBILE TRIP REDUCTION STRATEGIES:

AN ANALYSIS OF EMPLOYER-BASED TRIP REDUCTION PROGRAMS

A Thesis

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By

Jamie Jarvis

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APPROVED FOR THE DEPARTMENT OF
GEOGRAPHY AND ENVIRONMENTAL STUDIES

Dr. Lester Rowntree, Committee Chairperson,
Professor of Environmental Studies

Dr. Robert Schaeffer
Assistant Professor of Sociology

Ms. Colleen McCarthy
Workplace 2000

APPROVED FOR THE UNIVERSITY

ABSTRACT

AUTOMOBILE TRIP REDUCTION STRATEGIES:
AN ANALYSIS OF EMPLOYER-BASED TRIP REDUCTION PROGRAMS

by Jamie Jarvis

In an attempt to address air pollution and traffic congestion, employer-based trip reduction programs have been mandated in many urban and suburban areas in the United States. The goal of employer-based trip reduction programs is to reduce the number of automobile trips made during peak commute hours by encouraging employees to use alternatives to the single occupant automobile, such as carpooling, transit, bicycling, and walking.

To date research in the field of employer-based trip reduction is sparse and largely inconclusive. This has left employers to develop trip reduction programs by trial and error. Unfortunately, many employers have spent large amounts of money and staff time on trip reduction programs without achieving a significant reduction in employee automobile use.

This thesis identifies and evaluates employer-based trip reduction practices based on a review of the literature and in-depth interviews with transportation professionals. Recommendations are offered regarding effective trip reduction strategies that can be implemented at reasonable cost. These recommendations can assist the employers and public agencies who are responsible for developing and implementing employer-based trip reduction programs.

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LIST OF ABBREVIATIONS

AVR	Average Vehicle Ridership
BAAQMD	Bay Area Air Quality Management District
CAA	Clean Air Act
Caltrans	California Department of Transportation
CAP	Clean Air Plan
CCAA	California Clean Air Act
CARB	California Air Resources Board
CMA	Congestion Management Agency
CMP	Congestion Management Program
EPA	Environmental Protection Agency
ETC	Employee Transportation Coordinator
FHWA	Federal Highway Administration
HOV	High Occupancy Vehicle
ISTEA	Intermodal Surface Transportation Act
IVHS	Intelligent Vehicle Highway System
LEV	Low Emission Vehicle
Reg 13-1	Regulation 13, Rule 1
Reg XV	Regulation XV
RIDES	Rides for Bay Area Commuters
SCAQMD	South Coast Air Quality Management District

ABBREVIATIONS (Continued)

SCCMG	Santa Clara County Manufacturing Group
SIP	State Implementation Plan
TCM	Transportation Control Measures
TDM	Transportation Demand Management
ZEV	Zero Emission Vehicle

GLOSSARY

Average Vehicle Ridership. A measure of vehicle occupancy equal to the number of individuals traveling by any mode in a given area and time divided by the number of automobiles used to transport these individuals.

Carpool. A vehicle occupied by two or more people traveling together for the majority of the trip.

Compressed Work Week. A regular full-time work schedule which eliminates a round-trip commute trip on a regular basis. Examples include working four ten-hour days within a one week period or eight nine-hour days within a two week period.

Employee Transportation Coordinator. An individual designated by a business or organization to develop, market, administer, and monitor the employer trip reduction program.

Employer Trip Reduction Program: A group of measures developed and implemented by an employer that are designed to provide information, assistance, and incentives to employees. The purpose of such measures is to reduce the number of motor vehicles driven to the work site by increasing Average Vehicle Ridership.

High Occupancy Vehicle. A vehicle transporting two or more individuals. Includes carpool vehicles, buses, and trains.

Single Occupant Vehicle. A vehicle transporting one individual.

Telecommuting. A system of working at home or at an off-site facility. The employee often communicates with the work site using computers and telecommunications technologies.

Transportation Demand Management. Strategies that reduce the demand by automobiles on the transportation system. Transportation Demand Management includes many low cost strategies, such as carpooling and alternative work schedules

Vanpool. A vehicle occupied by 7 to 15 employees for the majority of the trip distance.

CHAPTER 1

INTRODUCTION

Statement of Problem

Most urban and many suburban areas in the United States are afflicted with air pollution and traffic congestion. The San Francisco Bay Area is no exception with air pollution levels that exceed both state and federal clean air standards. Increasingly congested roadways have led Bay Area residents to consistently rate traffic congestion as a major factor affecting the quality of life in the region (Bay Area Council 1991, 1). The culprit is the automobile, or more precisely our dependence on the single occupant automobile for transportation.

While air pollution and traffic congestion are the most commonly recognized impacts of automobile use, there are numerous other negative consequences associated with automobile dependence. Automobiles consume valuable, non-renewable resources and generate solid and hazardous wastes. The road and parking infrastructure required to support automobile use consumes valuable land, often prime farm land and habitat.

Automobile use is a significant drain on the U.S. economy. The economic costs associated with automobile use that are not recovered by user fees are estimated at $300 billion annually (MacKenzie, Dower, and Chen 1992, 23). The social costs of automobile use include limited mobility for individuals who can not drive, deaths and injuries in automobile accidents, and declining quality of life due to reduced community ties and increased traffic congestion.

Unless effective strategies are developed and implemented to reduce automobile use, the Bay Area can expect to suffer significant adverse health, environmental, economic, and quality of life impacts as early as the year 2000 (State of California Air Resources Board 1989, 6).

In response, a variety of legislation designed to reduce automobile use has been enacted in California. The most notable are the California Clean Air Act (CCAA) and Proposition 111. Although the CCAA focuses on air quality issues and Proposition 111 focuses on traffic congestion, both mandate employer-based trip reduction programs.

However, there is considerable controversy surrounding employer-based trip reduction programs. Because employer-based trip reduction is a relatively new concept, research in the field is sparse and largely inconclusive. In addition, there is a shortage of qualified professionals to provide guidance and assistance to employers. Employers faced with mandates have found themselves developing trip reduction programs by trial and error. Unfortunately, many employers have spent a considerable amount of time and money on trip reduction programs without significantly reducing the number of automobile trips to their work site. This lack of success has led to frustration and a general view that employer-based trip reduction programs may not be a cost effective way to address air pollution and traffic congestion.

Purpose, Scope, and Limitations of the Thesis

The purpose of this thesis is to identify effective trip reduction strategies that can be implemented by employers at reasonable cost.

This thesis focuses specifically on trip reduction strategies that are likely to be adopted by employers in response to mandatory ordinances and regulations. Since current ordinances and regulations focus almost exclusively on employee commute trips, only trip reduction strategies that apply to commute trips are investigated.

Interviews to gather information about existing trip reduction programs and determine employers' response to mandatory trip reduction requirements were conducted primarily with representatives from large Santa Clara County employers. Santa Clara County was chosen as a focus due to the researcher's experience with employer-based trip

reduction programs in Santa Clara County and the number and quality of professional contacts in the county. Focusing on one county also facilitates comparisons between different work sites because sites within the same county often have similar work force characteristics and are operating in the same transit and parking environment. Large employers were not specifically targeted, but larger companies generally have more experience with trip reduction programs and therefore provide more information and insight.

In spite of the limitations associated with the sample of employers selected for interviews, much of the information presented in this thesis is applicable to a variety of work sites. This thesis presents and discusses research studies conducted at various types and sizes of employers located throughout the Bay Area, the State of California, and the United States. Many of the challenges and opportunities presented to large employers in Santa Clara County will be faced by smaller employers in the county and by both small and large employers throughout the nation.

Methodology

Information from literature reviews, professional conferences, and interviews was used in developing this thesis. The primary sources for background information were public agency research reports and transportation industry journals.

The primary source of information pertaining to employers' current trip reduction programs and their response to mandatory trip reduction requirements was interviews with representatives at 17 Santa Clara County employers. The employers and the contact person for each company were identified primarily through the researcher's participation in professional organizations, including the Santa Clara County Manufacturing Group's Commuter Transportation Council and the Northern California Chapter of the Association for Commuter Transportation. The employers selected for interviews have active trip

reduction programs and an appropriate contact person who was willing to be interviewed. A list of the employers and interview contacts appears in Appendix B.

Although employer-based trip reduction programs in Santa Clara County are most often found at large, high-technology companies, special effort was made to interview as wide a variety of employers as possible. The employers selected for interviews include a variety of industries, sizes, and locations. The selected employers have varying levels of experience with trip reduction programs ranging from more than 20 years experience to less than 1 year. In addition, economic conditions at the selected employers range from robust growth to rapid down sizing.

Interviews were conducted with the individual within the company who has primary responsibility for the trip reduction program. In large companies this person is often a full-time employee transportation coordinator or manager. In smaller companies this individual is often employed in an employee services or site services department and works part-time on the trip reduction program.

A questionnaire consisting of 22 questions was developed and used to guide and record the interviews. The interview questionnaire appears in Appendix B.

The interviews were conducted in person at the employers' work site when possible. In a few cases the interview was conducted during the lunch hour at a restaurant near the employers' work site to accommodate the transportation coordinator's schedule. In cases where in-person interviews could not be arranged, the interviews were conducted by telephone. Interviews averaged 30 to 60 minutes in duration. Follow-up phone calls were made as necessary to clarify responses.

The results of the interviews with Santa Clara County employers are compared with previous case studies performed throughout the nation to identify correlations and discrepancies between the results. In this way, employer-based trip reduction strategies

that appear to be effective in most work environments are identified. This comparison also provides insight into how the characteristics of a specific work site provide unique challenges and opportunities for trip reduction efforts.

Statement of Hypothesis

Studies of effective programs demonstrate that employer-based trip reduction programs have the potential to play an important role in reducing automobile pollution and traffic congestion. However, the limited success and high cost of many existing programs indicates that employer-based trip reduction programs must be carefully planned and well implemented to achieve a significant reduction in automobile trips at reasonable cost. Although research indicates that there are some trip reduction strategies that are effective at most work places, effective strategies appear to vary with location, work force composition, company culture, and numerous other site-specific factors. The most effective trip reduction program will be one that is customized for a specific work environment.

Assumptions

Based on the literature review and the researcher's experience with employer-based trip reduction programs the following assumptions have been developed for investigation in this thesis:

- Some of the most effective strategies, such as parking charges and compressed work weeks, are unpopular with employers or employees and are unlikely to be implemented under current circumstances.
- Some ineffective and/or excessively expensive strategies will be adopted by employers due to insufficient knowledge, planning, and analysis as well as pressure from public agencies, vendors, and employees. Once these strategies are adopted they are difficult to discontinue.
- The amount of time and money spent on a program will not necessarily correlate

to program effectiveness. Other difficult to quantify factors, such as staff commitment, creativity, resourcefulness, management support, and corporate culture will have a greater impact on program effectiveness.

- Many employers will make the minimum acceptable effort to comply with mandatory trip reduction requirements for a variety of reasons including financial constraints, resistance to employer responsibility for employee commute behavior, and doubt that employer-based trip reduction programs can be successful.
- Employer-based programs will be of limited success and unnecessarily expensive until supporting market-based measures and urban planning practices are implemented.

Analysis

The automobile crisis shares many similarities with other environmental issues including waste generation and energy consumption. Although the serious environmental, economic, and social impacts of automobile use make it obvious that we can not continue on the road we are on, there is much resistance to change. At the same time some public agencies are attempting to curb automobile use by mandating employer-based trip reduction programs,other public agencies continue to provide tremendous economic subsidies to automobile owners and plan our cities around the automobile. Many years and dollars were spent building the automobile society and it will be an expensive, time consuming, and sometimes painful process to curb automobile use.

Employer-based trip reduction was selected as a starting point not because these programs were viewed as the most effective means of curbing automobile use, but primarily because regulators had the authority to require these programs. Many of the potentially more effective strategies, such as market-based measures require legislative approval, which is often difficult and time consuming to obtain.

Carefully planned and well implemented employer-based trip reduction programs

can play an important role in reducing automobile use. However, employer-based trip programs alone can not address the air quality and traffic congestion problems that plague most cities. Instead, employer-based trip reduction should be viewed as just one component in a comprehensive approach that includes market based measures, urban planning practices, new technologies, and other appropriate regulations.

CHAPTER 2

THE AUTOMOBILE SOCIETY: CAUSES AND CONSEQUENCES

Before we can fully understand the difficulties employers encounter as they try to change employees' driving behavior we must understand the factors that contributed to dependence on the automobile. Similarly, we must be aware of the negative impacts of automobile use to understand the importance of employer-based trip reduction programs and other strategies designed to reduce automobile use.

Creating the Automobile Society

When the first commercial automobile was introduced by Mercedes Benz in 1901, it was thought that automobiles would always be luxury items for the very wealthy. In fact, Mercedes Benz estimated worldwide demand would peak a less than 1 million automobiles. However, in the 1920s Henry Ford's mass production techniques brought automobile ownership within the reach of millions of Americans. In 1950 Americans operated 40 million automobiles (Renner 1988, 7). By 1990 this number had grown to nearly 140 million (Renner 1988, 7).

Several factors contributed to the proliferation of the automobile in the United States. One of the most significant factors was the government's post World War II policy to encourage home ownership among the middle class by maintaining artificially low interest rates. This policy created an unprecedented demand for housing. Shrewd land developers met this demand by building houses on low cost land outside the city limits. However, because these suburban cities were not served by transit systems, residents needed automobiles for transportation. Automobile manufacturers facilitated car ownership among middle class suburbanites by offering installment purchase plans.

Low interest rates were just the first of many government subsides that would encourage automobile use. Car owning suburbanites also needed roads. The U.S. gov-

ernment responded by building 3 million miles of roads and 40,000 miles of interstate highway systems (Schaeffer 1990, 15). Car owners also needed a reliable supply of cheap fuel. The U.S. government has maintained low fuel costs by a variety of means ranging from tax credits for oil exploration to an on-going military presence in the Persian Gulf. It is estimated that the U.S. government spends more than $300 billion each year to support automobile use or about $2400 for every passenger car (MacKenzie, Dower, and Chen 1992, 23).

During the 1930s and 1940s a pro-automobile business consortium led by General Motors assured that the automobile would face no competition by systematically dismantling more than 100 clean, efficient, electric train systems in 45 cities throughout the United States (Mokhiber 1988, 227). Since this time transit ridership has steadily declined from 17 billion passengers in 1950 to only half this amount in 1990 (Schaeffer 1990, 15). The limited transit still available suffers from government spending priorities. The current modest level of transit subsidies continues to be threatened as local, state, and federal governments attempt to balance budgets. Meanwhile, the huge subsidies to the automobile remain largely untouched.

Modern urban planning practices have also contributed to the proliferation of the automobile. Land use zoning intentionally separated workplaces, residences, and shopping facilities. Urban planners thought they were providing a public service by separating residences from the nuisances associated with work sites and shopping centers. In fact, single-use zoning isolates residents from jobs and services, making automobile use necessary for even the most basic trips. Ironically, many older mixed-use communities are now considered the most desirable places to live. Communities that are designed for the automobile not only encourage automobile use, but usually discourage other forms of transportation. Transit is often non-existent and bicycling and walking are infeasible, if

not unsafe.

Environmental Impacts

Automobiles consume large quantities of valuable resources and emit pollutants that not only damage our health, but also cause extensive damage to wildlife, forests, crops, and lakes. Automobiles are a major contributor to serious global air pollution problems, including acid rain, ozone depletion, and global warming.

In the past, efforts to reduce air pollution have relied on increasingly stringent controls on industrial air pollution sources, such as factories and refineries, and requirements for more efficient emission control equipment on new automobiles. These approaches have significantly reduced emissions. In fact, air quality in many urban areas, including the Bay Area, has been improving steadily over the past 20 years. Unfortunately, the California Air Resources Board (CARB) predicts that air quality will begin to worsen as shown in Figure 1 by the year 2000 unless additional pollution control strategies are adopted.

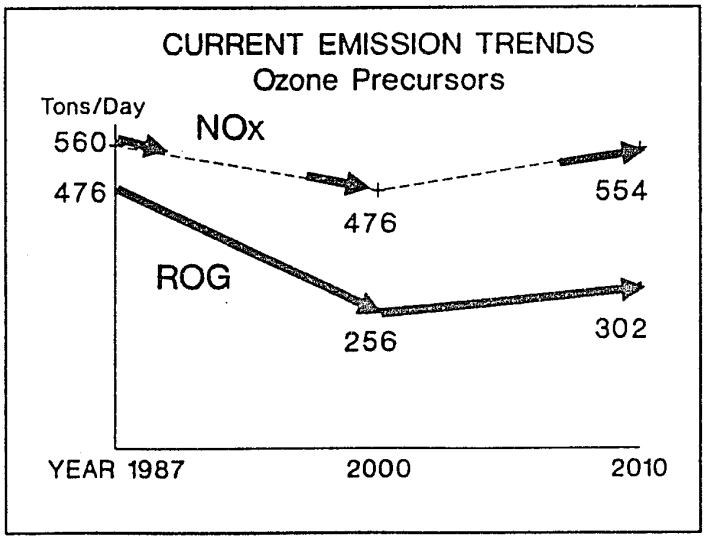


Figure 1. Current Emission Trends for Ozone Precursors.
(Source: State of California Air Resources Board 1989, p. 6)

While more stringent controls on smokestack and tail pipe emissions could achieve additional reductions in air emissions, significant reductions from these sources will be expensive to achieve. Inexpensive emission control solutions have already been exhausted and as industrial and automobile sources have become significantly cleaner it is more difficult to achieve additional reductions. The diminishing returns on emission controls have forced air pollution control agencies to explore new and creative approaches to reduce air pollution. Since automobiles are the single largest source of pollution in most urban and suburban areas, controls on automobile use are the logical place to start.

Although much of the concern about automobile use focuses on air pollution, automobiles have other serious impacts on our environment. Automobiles consume large quantities of resources and generate solid and hazardous wastes. Automobile manufacturing requires large amounts of energy, water, metals, and other valuable resources. American drivers consume 82 million gallons of non-renewable fuel each day (Earthworks Group 1989, 89).

Each year over 9 million cars are scrapped with only a small percentage being recycled (Seymour and Girardet 1987, 159). Over 200 million tires and 64 million batteries are disposed of each year (Seymour and Girardet 1987, 159). Automobile fluids including oil, brake fluid, and antifreeze are often not disposed of properly causing water and soil contamination. Automobile residues are a major source of toxic pollutants in many aquatic environments.

Large tracts of habitat and prime farm land are sacrificed to provide roads and parking spaces for our automobiles. Close to half the land area in most cities is paved (Lyman 1990, 38).

Health Effects

Over 100 million Americans live in regions where air quality does not meet federal

health-based standards for clean air (MacKenzie, Dower, & Chen 1992, 13). Automobile emissions that are harmful to human health include carbon monoxide, hydrocarbons, nitrogen oxides, and particulates. In addition, carbon monoxide and hydrocarbons react in the presence of sunlight to form ozone. Ozone pollution, which is commonly referred to as smog, is of primary concern in most urban areas. California cities are particularly susceptible to ozone formation due to geographical and meteorological factors.

Automobile emissions can have long term effects on children and can be life threatening to the elderly and individuals with pre-existing respiratory or heart ailments. The American Lung Association estimates that 53% percent of Californians are sensitive to current levels of air pollution. This includes individuals with cardiovascular and respiratory disease, children, the elderly, and athletes. The acute effects associated with air pollution exposure include fatigue, headaches, nausea, slow reflexes, shortness of breathe, watery eyes, and dry throat. Exposure to air pollution can also contribute to chronic health conditions including irreversible lung cell damage, decreased lung function, and an increase in chronic respiratory disease. The American Lung Association estimates that air pollution is a contributing factor in the deaths of 30,000 Americans.

Research indicates that children raised in high pollution areas suffer dramatic and permanent lung damage, including prematurely aged lungs, decreased lung capacity, and reduced tolerance for respiratory infections. According to a University of Southern California study, second grade children raised in the Los Angeles basin suffered a 10-15% loss in lung function compared with Houston children.

Economic Costs

Many costs that should be considered as part of the normal costs of owning and operating an automobile are not paid directly by motorists. This presents two problems. First, since many of the costs of automobile use are hidden to the driver, there is little

economic incentive for drivers to curb automobile use. Second, individuals who use alternatives means of transportation are paying for facilities and services that they do not use.

Gas taxes and other user fees covered only about 60% of the $33.3 billion spent on building, improving, and repairing roads in 1989 (MacKenzie, Dower, and Chen 1992, 9). Free parking amounts to an $85 million subsidy to drivers (MacKenzie, Dower, and Chen 1992, 10).

An estimated $68 billion not covered by user fees is spent each year vehicle services, such as highway patrols, traffic management, parking enforcement, and traffic accident response (MacKenzie, Dower, and Chen 1992, 10). Automobile accidents result in an additional $55 billion in costs not directly borne by drivers (MacKenzie, Dower, and Chen 1992, 10). Cost estimates for the health related effects of air pollution range from $10-93 billion per year (MacKenzie, Dower, and Chen 1992, 12).

Since motorists use about half the U.S. supply of imported oil, up to half the cost of maintaining a U.S. military presence in the Middle East or $50 billion a year can be attributed to automobile drivers (MacKenzie, Dower, and Chen 1992, 17).

Altogether, the cost of roads, parking, police services, automobile accidents, health effects, and foreign oil supply protection, that are not directly paid by automobile drivers, is estimated at over $300 billion per year or more the 5% of the United States Gross National Product (MacKenzie, Dower, and Chen 1992, 6). This amounts to a subsidy of nearly $2500 per each passenger automobile.

Although congested roadways are often viewed as just a nuisance, there are significant economic costs associated with traffic congestion. Californians waste 200,000 hours daily and California businesses lose $3 million due to traffic congestion (Rides for Bay Area Commuters 1992, 2). Traffic congestion is predicted to increase an average of

25% on California roadways over the next 10 years with some major roadways experiencing significantly higher increases in congestion (Rides for Bay Area Commuters 1992, 2). Exposure to traffic congestion contributes to stress, hypertension, negative moods, and aggressive driving habits. Commuters often show up at work too tired or too irritated to function effectively. The General Accounting Office estimates national productivity losses from congestion at $100 billion annually (MacKenzie, Dower, and Chen 1992, 18).

As with many environmental issues, the environmental costs associated with automobile use are difficult to quantify in dollars. The impacts include depleted resources, local and global pollution, and loss of habitat and wildlife.

Social Consequences

The social consequences of automobile dependence are high. In an automobile dependent society the poor, handicapped, young, and elderly suffer from lack of affordable transportation. Cities designed around the automobile rarely have adequate mass transportation systems or pedestrian and bicycling facilities. Individuals who can't afford cars or are unable to drive due to physical or age limitations often have difficulty reaching schools, work sites, and social services.

The automobile consumes valuable services that could otherwise be spent to address serious social problems. Nearly 40% of police service are spent on automobile related incidents, such as accidents, thefts, law enforcement, and traffic control. Automobile use also has tragic consequences. According to the U.S. Department of Transportation automobile related accidents in the United States in 1992 resulted in over 39,000 deaths and nearly five million injuries.

Although difficult to quantify the automobile has certainly played a major role in the decline of the American community. In the past people worked, lived, and shopped in the same community. People formed strong and lasting ties to their community and their

neighbors. The automobile greatly reduces community ties by enabling individuals to work and shop far from their homes.

Traffic congestion significantly impacts an individual's quality of life. Traffic congestion limits employment and housing opportunities by increasing commute times and decreasing the acceptable distance between home and work. As commuters spend more time in traffic congestion less time is available for social, family, and recreational activities.

CHAPTER 3

TRANSPORTATION DEMAND MANAGEMENT

Background

In the past, the increasing demand for transportation was met by constructing more roads. However, in many communities large-scale road construction projects are no longer feasible due to space limitations, expense, and environmental impacts. Even if these obstacles could be overcome, the increasing demand for transportation is so great in many areas that roads could not be built fast enough to meet the demand.

A relatively new approach to meeting the increasing demand for transportation is Transportation Demand Management (TDM). The goal of TDM is to improve the utilization of existing and future transportation resources. For example, the demand for increased highway capacity can be met with existing highways by distributing peak hour demand and increasing vehicle occupancy. A major component of TDM focuses on reducing the demand for roadways by encouraging the use of transportation alternatives, such as carpooling, transit, bicycling, and walking.

There are three approaches public agencies use to implement Transportation Demand Management: 1) regulation 2) market-based pricing measures, 3) urban planning. In addition, the private sector is taking an active role in promoting technology-based TDM strategies, such as telecommuting and intelligent vehicle highway systems (IVHS).

Regulations and Ordinances

In the past, regulation focused on reducing automobile emissions by mandating stricter emission control requirements for new automobiles. California continues to be a leader in regulating automobile emissions. The California Clean Air Act (CCAA) spawned regulations requiring car manufactures to phase-in Low Emission Vehicles (LEVs) and Zero Emission Vehicles (ZEVs) by 1998. However, LEVs and ZEVs have limited poten-

tial to address air pollution in the short term due to the time required for a significant number of new vehicles to replace older vehicles. In addition, LEVs and ZEVs alone will do little to address traffic congestion.

Due to the limitations associated with more stringent requirements on vehicle emissions, the regulatory focus has shifted towards Transportation Demand Management. Regulations and ordinances designed to reduce automobile use have been enacted at the federal, state, and local level.

The Federal Clean Air Act (CAA) requires states with metropolitan areas classified by the Environmental Protection Agency (EPA) as having severe or extreme ozone pollution to develop State Implementation Plans (SIP) capable of significantly reducing automobile emissions. The SIP must include extensive TDM measures. The metropolitan areas affected are Los Angeles, Baltimore, Chicago, Houston, Milwaukee, New York/ New Jersey/Connecticut, Philadelphia/Wilmington, and San Diego.

The California Clean Air Act (CCAA) requires local air basins to meet more stringent state air quality standards. A comparison of the federal and state standards appears in Table 1. Most metropolitan regions in California, including the San Francisco Bay Area, do not meet the state standards for ozone, carbon monoxide, and particulates. Air pollution levels for the Bay Area and the number of exceedances of state and federal standards in 1992 are shown in Table 2. The regional air districts for air basins that do not meet state standards must prepare a Clean Air Plan (CAP) detailing measures that will be taken to reduce air emissions. The CAP must include Transportation Control Measures (TCMs) capable of significantly reducing automobile use. The CAP submitted by the BAAQMD contains the 23 TCMs.

In 1990, Californians voted to increase funding for California's transportation system by $15.5 billion over the next ten years by increasing the state's gas tax by 9 cents

per gallon. However, with the passage of Proposition 111 came the requirement that all urbanized counties prepare an annual congestion management program (CMP). The gas tax funds can be withheld from cities and counties that do not participate in the CMP. Proposition 111 specifies that TDM elements must be included in the CMP.

In addition, many cities have enacted ordinances requiring TDM measures. These ordinances often focus on new development by requiring developers or employers to implement TDM measures as a condition of project approval. For example, the City of Pleasanton, California required the developer of Hacienda Business Park to implement extensive TDM measures.

All the above mentioned regulations and ordinances require or strongly encourage employer-based trip reduction programs to be included as a TDM measure.

Table 1. Ambient Air Quality Standards

Pollutant	National Standards[a]	California Standards[a]	Averaging Time
Ozone	12 pphm	9 pphm	1 hour
Carbon Monoxide	9 ppm 35 ppm	9 ppm 20 ppm	8 hour 1 hour
Nitrogen Dioxide	5.3 pphm -	- 25 pphm	Annual Avg 1 hour
Sulfur Dioxide	30 ppb 140 ppb	- 50 ppb	Annual Avg 24 hour
Suspended Particulates PM10	50 ug/m3 150 ug/m3	30 ug/m3 50 ug/m3	Annual Avg 24 hour

[a] ppm = part per million, pphm = parts per hundred million, ppb = parts per billion, ug/m3 = micrograms per cubic meter.

Source: Bay Area Air Quality Management District

Table 2. Air Pollution in the Bay Area by Station and Contaminant: 1992

Stations by Sub-Region	OZONE Max Hr	OZONE Days Ntl.	OZONE Days Cal.	OZONE 3-Yr Avg.	CO Max 8-Hr	CO Days Ntl.	NO_2 Max Hr	NO_2 Days Cal.	SO_2 Max 24-Hr	SO_2 Days Cal.	PM_{10} Ann. Geo. Mean	PM_{10} Days Ntl.	PM_{10} Days Cal.
North Counties													
Santa Rosa	8	0	0	0.0	4.0	0	10	0	-	-	-	-	-
Napa	9	0	0	0.0	5.1	0	6	0	-	-	23.9	0	5
Vallejo	10	0	1	0.0	6.4	0	7	0	8	0	-	-	-
Fairfield	10	0	3	0.0	-	-	-	-	-	-	-	-	-
Sonoma	9	0	0	0.0	-	-	-	-	-	-	-	-	-
Central Bay													
San Francisco	8	0	0	0.0	6.4	0	9	0	11	0	27.6	0	9
San Rafael	7	0	0	0.0	4.8	0	8	0	-	-	22.0	0	5
Richmond	8	0	0	0.0	4.0	0	8	0	8	0	23.4	0	3
Oakland	8	0	0	0.0	4.5	0	-	-	-	-	-	-	-
San Leandro	11	0	2	0.0	-	-	-	-	-	-	22.7	0	2
Peninsula													
Redwood City	9	0	0	0.0	4.9	0	10	0	-	-	24.9	0	7
Mountain View	11	0	1	0.0	-	-	-	-	-	-	-	-	-
East Contra Costa													
Concord	11	0	3	0.0	5.3	0	11	0	8	0	22.6	0	8
Pittsburg	11	0	3	0.0	3.8	0	8	0	21	0	-	-	-
Bethel Island	11	0	7	0.0	3.9	0	7	0	11	0	22.6	0	4
So. Alameda County													
Livermore	11	0	14	0.7	4.3	0	11	0	-	-	25.8	0	5
Fremont	12	0	5	0.3	4.1	0	9	0	-	-	23.7	0	4
Hayward	13	1	1	0.3	-	-	-	-	-	-	-	-	-
Santa Clara Valley													
San Jose, 4th St	12	0	3	0.0	7.3	0	10	0	-	-	28.4	0	13
Alum Rock, S.J.	13	1	5	0.3	-	-	-	-	-	-	-	-	-
Burbank, S.J.	11	0	1	0.3	7.5	0	10	0	-	-	29.5	0	9
Moorpark, S.J.	-	-	-	-	-	-	-	-	-	-	23.8	0	8
Tully Road, S.J.	-	-	-	-	-	-	-	-	-	-	26.3	0	11
Los Gatos	13	1	3	0.3	-	-	-	-	-	-	-	-	-
Gilroy	12	0	12	0.3	3.5	0	-	-	-	-	-	-	-
District Days		2	23			0		0		0		0	18

Source: Bay Area Air Quality Management District

Market-Based

One reason many people drive alone in their automobiles is because the direct cost to the individual of driving an automobile is relatively inexpensive. One of the most powerful ways to curtail automobile use is through economic incentives and penalties. Toll roads, congestion pricing, smog-based registration fees, gas taxes and parking charges are examples of pricing mechanisms that could be used to reduce automobile use. As part of a market-based approach subsidies to the automobile would eventually be eliminated. Some advocates of alternative transportation argue that the revenue generated by pricing mechanisms should be used to subsidize alternative modes of transportation. The logic is that the automobile has benefited from years of tremendous subsidies, so subsidies will be required to bring other modes of transportation to an equal or higher level.

The effectiveness of market-based measures is not disputed. In fact, it is widely accepted that market-based measures are among the most effective TDM strategies. In addition to effectiveness, market-based strategies have two distinct advantages over other TDM strategies; 1) they can be implemented quickly and 2) can have an immediate effect on automobile use.

However, economic solutions are not without drawbacks. Perhaps the most negative aspect is that some pricing measures are regressive and therefore place a larger burden on low income individuals than high income individuals. For example, if gas taxes were increased by 25 cents per gallon, high income drivers would probably pay the tax and continue to drive as much as they wanted. However, such a tax might make driving unaffordable for low income drivers.

Although the goal is to reduce driving, forcing low income drivers out of their automobiles is not an attractive or efficient solution. First, limiting low income individuals'

access to transportation limits their access to work places, schools, and community services. This can lessen low income individuals' ability to improve their economic status and could result in increased need for public assistance. Secondly, limiting the automobile use of low income individuals is inefficient, because low income drivers drive less than high income drivers.

Fortunately, economic measures can be implemented in ways that do not cause an undue burden on low income drivers. For example, progressive measures such as vehicle registration fees tied to the value of the automobile would generally be low cost for low income drivers who typically do not own expensive cars. Similarly any use-based fee, such as gas taxes, congestion pricing, toll roads, and mileage-based registration fees would have greatest impact on those who drive most. Even regressive pricing measures, such as gas taxes and parking charges, can be mitigated to reduce the impact on low income drivers. Low income workers could receive a tax credit to partially offset the cost of pricing measures. Some pricing measures could also be implemented on a sliding-scale basis.

Another potential issue associated with an economic approach is that there is no guarantee that alternatives to the automobile will be developed. The revenue generated by pricing measures could disappear into general funds with no direct benefit to the drivers who pay the fees. In this scenario economic measures would be entirely punitive and therefore highly unpopular. Instead, it is proposed that funds raised from market-based measures be invested in developing transportation alternatives.

The single biggest obstacle to the implementation of market-based TDM measures is political. Politicians are hesitant to propose or support measures that significantly raise the cost of driving. For example, many transportation professionals believe that a gas tax of at least 50 cents per gallon is required to significantly change driving behavior, but

politicians are unlikely to support increases of more than 5 cents per gallon for fear of voter reprisal.

Urban Planning

One way to reduce automobile use is to plan cities that don't require automobile transportation to meet basic needs. Increasing the availability and convenience of transportation alternatives is of key importance. Cities with well developed transit systems, such as San Francisco, California have a much higher percentage of transit riders than cities with less developed systems, such as neighboring San Jose, California. Unfortunately, increasing the availability of transit options can be expensive and time consuming.

Another urban planning approach to reduce automobile use focuses on eliminating the need for many automobile trips by placing jobs, housing, and shopping in close proximity. Many communities are now encouraging high density, mixed-use development, particularly in downtown business districts, as a way to address transportation issues and revitalize decaying urban areas. High-density residential development is also being encouraged near transit stations. San Francisco Bay Area planners envision transit villages consisting of housing, stores, cinemas and public spaces tied directly to rail stations through pedestrian walkways.

The major drawbacks to urban planning TDM strategies are the cost and time associated with implementing urban planning practices that will significantly reduce automobile use. Since it is not feasible to tear down cities that were designed around the automobile and start from scratch, small improvements are usually made over a long period of time.

Technology

Although most transportation professionals agree that technology alone can not address our transportation problems, there are some interesting new technologies that can

play a role in the overall TDM picture. Dramatic advances are being made in the field of low emission and zero emission vehicles. Both industry representatives and government officials speak of converting defense contractors to transportation contractors who would develop and construct advanced transportation systems including high speed rail.

Intelligent vehicle highway systems (IVHS) are being proposed that notify drivers of trouble spots, adjust signal timing, and in some of the more futuristic schemes actually drive our cars for us. TravInfo is a proposed advanced traveler information system in the San Francisco Bay Area. Data will be gathered from traffic monitoring systems, the California Highway Patrol, Freeway Service Patrol tow trucks, and aerial traffic reporters Individuals will be able to access TravInfo by telephone, computer modem, and specialized in-auto receivers.

There is significant interest, particularly among high technology companies, in developing telecommunications technologies that would enable workers to efficiently complete their job responsibilities without traveling to the work site. This approach, often referred to as telecommuting, would enable employees to work from home or satellite offices using computers and telecommunications equipment to interact with the main office. Proponents maintain that telecommuting improves employees' quality of life and results in higher worker productivity. Skeptics express concerns about set-up costs and the management of off-site employees.

In most cases technological solutions will not be expedient or inexpensive to implement. In addition, some technological solutions such as advanced IVHS systems will have to overcome commuter resistance and significant liability issues. However, strong government and industry support will advance the role of technological solutions to transportation problems.

CHAPTER 4

EMPLOYER-BASED TRIP REDUCTION: AN OVERVIEW

Background

Employer-based trip reduction is only one component of TDM. However, employer-based trip reduction has gained considerable attention, because it is one the first TDM strategies to be widely implemented. The reason for the initial emphasis on employer-based trip reduction is not because employer-based programs are considered the most effective TDM strategy, but because regulatory agencies have the authority to require these programs. Many other TDM strategies require legislative approval before they can be implemented.

Employer-based trip reduction programs first emerged in the United States during the 1970s in response to oil shortages. Some employers instituted trip reduction programs during this time as an employee service and/or a positive community relations program. These trip reduction programs usually consisted of encouraging employees to carpool and offering carpool matching assistance. Many of these programs were discontinued once the energy crisis had passed.

Employer-based trip reduction programs have been required by cities in conjunction with the construction of new facilities. This usually occurs when a developer is seeking approval for a major new project in an area that already has significant traffic congestion problems.

To date, the most widespread implementation of employer-based trip reduction programs is in Southern California where trip reduction programs were mandated by the South Coast Air Quality Management District (SCAQMD) in 1987. The South Coast air basin, which includes the greater Los Angeles area, has the worst air quality in the nation. The SCAQMD enacted Regulation XV (Reg XV) to comply with Federal and State air quality regulations.

With the passage of the California Clean Air Act (CCAA) in 1988 air quality agencies in all regions that do not meet state clean are required to implement all reasonably available Transportation Control Measures (TCMs). The State of California Air Resources Board (CARB) has specified that employer-based trip reduction regulations are considered a reasonably available TCM and must be part of the regional air quality agencies Clean Air Plan (CAP).

The CAP submitted by the BAAQMD contains 23 TCMs including TCM #2: Employer-based Trip Reduction Rule. However, as Figure 2 shows many of the proposed TCMs require additional funding and/or legislative approval for implementation. For the foreseeable future the BAAQMD must rely heavily on the TCMs, like the Employer-based Trip Reduction Rule, that can be reasonably implemented with available funds and pre-existing authority.

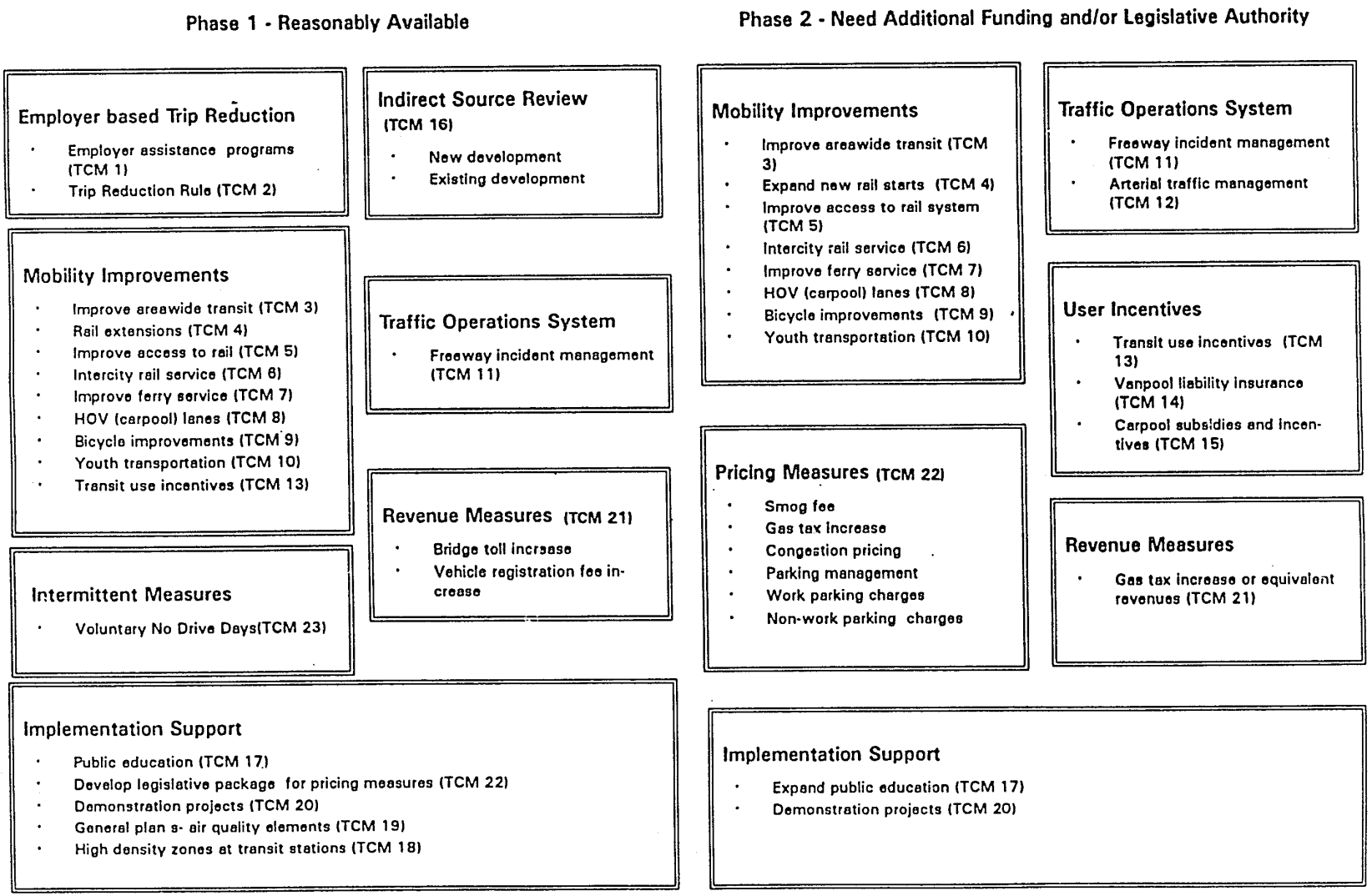
The 1990 passage of Proposition 111 in California requires the implementation of trip reduction programs at the county level as a means of addressing traffic congestion. However, since the requirements for trip reduction programs resulting from the CCAA are more stringent than those specified in Proposition 111, compliance with the region's air district requirements as specified in Reg 13-1 will satisfy the trip reduction component of Proposition 111.

With the passage of the 1991 Federal Clean Air Act (CAA) amendments employer-based trip reduction has begun to spread throughout the nation. The CAA requires employer-based trip reduction programs in the eight metropolitan areas with the worst air pollution. In these areas employers with 100 or more employees are required to implement trip reduction programs capable of increasing vehicle occupancy by 25%.

Employer-based Trip Reduction Strategies

Most employer-based trip reduction strategies fall into one of the following

Figure 2. Bay Area Transportation Control Measures (TCMs)
(Source: Bay Area Air Quality Management District)



categories: education and information, promotion, services, incentives and penalties, facilities, employer-sponsored transportation, or alternative work arrangements. Various trip reduction strategies are discussed in this section.

Education and information. Educating employees about the issues surrounding automobile use and providing information about available alternatives is usually the starting point for an employer-based trip reduction program. Newsletters, bulletin boards, and electronic mail are common ways to provide information to employees. Topics might include the health, environmental, and economic impacts of automobile use and the benefits of commute alternatives. Information about transportation alternatives is often provided in person or by phone by an on-site transportation coordinator or at centrally located, self-serve information centers. Although education and information are necessary components of an overall employer-based trip reduction program, this strategy does not by itself appear to achieve significant reductions in automobile use.

Promotion. Although there is some overlap between education and information and promotion, promotion has a distinct marketing focus. The benefits of commute alternatives over solo driving are promoted with attractive brochures, fliers, and displays. Commuters are encouraged to participate in special events, such as Bike to Work Day, Clean Air Week, Try Transit Week, and Beat the Back-up Week. Another popular promotional event is a commuter fair. A commuter fair typically consists of exhibitors from local transit and ridesharing agencies and may also include bicycle organizations and shops, and environmental organizations. Employee participation in campaigns and events is often encouraged with complimentary food, giveaways, and prizes. Like education and information, promotional efforts raise employee awareness, but do not necessarily result in a significant change in driving behavior.

Services. A variety of services that facilitate the use of commute alternatives can

be offered or coordinated by employers. These include carpool ridematching, on-site transit pass sales, and transit and bike route planning assistance. Services that fulfill a real employee need can plan an important role in an trip reduction program. For example, common barriers to the formation of carpools include inability to find a carpool partner and unwillingness to carpool with strangers. Employers can help overcome these barriers by maintaining carpool databases and even providing situations for potential carpoolers to meet, such as a commuter coffee break or brown bag lunch.

In addition to services that facilitate the use of commute alternatives, employers can also offer services that reduce the need for employees' personal automobile use during the day. For example, services such as banking, postal, photo developing, and dry cleaning can be offered or coordinated at the work site to eliminate the need for employees to perform errands in their automobiles at lunch time and before and after work. To be effective services must be carefully selected to meet the needs of the employees at a specific work site. Most services are not expensive to implement, but some can require considerable staff time to manage and operate.

Economic incentives and disincentives. Incentives can take a variety of forms and can be intermittent or continuous. Common financial incentives include transit pass subsides and continuous compensation, commonly $1 per day, to commute alternative users. Employers have also offered prizes ranging from coffee mugs and free lunches to trips to Hawaii and $1000 cash awards. Some employers offer time off with pay as an incentive to entice employees who do not respond to financial rewards. The cost to the employer of offering incentives can be substantial. One large San Francisco Bay Area employer spends $20,000 per month on transit subsidies alone.

With the exception of transit and vanpool subsidies, the current federal tax code does not support financial incentives for commute alternative users. Incentives given to

carpoolers, bicyclists, and walkers are fully taxable as additional income, thus diluting the value to the commuter.

Incentives can be particularly effective when combined with disincentives like parking charges. In addition, economic disincentives can generate revenue to fund other trip reduction strategies. However, many employers, particularly those in suburban environments, are very reluctant to implement parking charges due to employee resistance and enforcement issues.

One solution that addresses employee resistance to parking charges is to offer a transportation allowance to all employees. Employees who continue to drive alone to work are then charged an amount equivalent to the monthly transportation to park at the work site. Employees who carpool, ride transit, bicycle, or walk to work do not have to pay for parking and realize a net gain in income. Although employees who drive alone to work realize no net loss, the fact that they could keep the transportation allowance if they used a commute alternative has proven to be a powerful motivator (Bhatt 1990, 12).

Facilities. Many cities and counties specify site design guidelines for new work sites to facilitate the use of transportation alternatives to the site. Site design guidelines can specify requirements for carpool parking, bicycle parking, shower facilities, and transit shelters. In addition to facilities that encourage the use of transportation alternatives to and from the work site, many work sites include facilities that reduce the need for employees to drive at lunchtime and before and after work. These include on-site cafeterias, fitness facilities, automatic tellers, sundry stores, and child care facilities. While most new work sites include facilities that can play a role in encouraging the use of transportation alternatives, most employers find that retrofitting an existing work site is prohibitively expensive.

Employer-sponsored transportation. One of the most common forms of employer-

sponsored transportation is shuttle service to nearby transit stations. Since many work sites are not directly served by transit, employer-sponsored shuttles are often necessary to facilitate employees' use of transit. In addition, employers with large work sites or multiple work sites in different locations may operate shuttle service to transport employees between buildings and sites. However, shuttle service is expensive to provide, particularly on a cost per rider basis.

Many employers provide back-up transportation to commute alternative users in cases of emergency and unanticipated overtime. This practice, commonly referred to as a guaranteed ride home, is designed to eliminate one of the major barriers to the use of commute alternatives, namely employee concern about being without transportation in emergency or overtime situations. Employers typically arrange and pay for eligible employees to take a company car, taxi, or rental car to their destination. While the cost per incident may be high, many employers find that the usage rate is often as low as 2% of the eligible employee population (Commuter Transportation Services 1990, 4).

Some employers sponsor employee vanpools. Company-owned vanpools are less common now than in past years, due to liability concerns and changes in tax codes that make owning vanpool vans less attractive to employers. Instead vans are often leased from a third party vendor by a group of employees. The employer may help organize the vanpools and provide some financial support to reduce the cost to each vanpool rider.

Alternative work arrangements. Alternative work arrangements include work at home, telecommuting, and compressed work week schedules. Unlike other trip reduction strategies, alternative work arrangements focus on eliminating trips rather than shifting automobile trips to another mode. Alternative work arrangements are often viewed favorably by employees, but skeptically by employers. Employees perceive alternative work arrangements as a quality of life improvement. Employers often have concerns

about worker productivity.

Telecommuting consists of employees working at home, usually on a part-time basis, using computers and telecommunications equipment to communicate with the primary work site. Because the cost of providing telecommuting equipment to an employee for home use is high, telecommuting is most prevalent in companies where employees already have home computer equipment or the company can provide the equipment at low cost due to a special circumstance, such as self-manufacture or a down sizing that results in surplus equipment.

Many businesses, who would benefit from widespread acceptance of telecommuting including telephone, computer, and telecommunications companies, are aggressively promoting telecommuting as a trip reduction strategy. Telecommuting is promoted as increasing productivity, improving recruitment and retention, and reducing office space requirements.

Compressed work weeks consist of employees working a standard 40 hour week in less than 5 days. Common compressed work schedules are 40 hours in 4 days and 80 hours in 9 days.. Although compressed work weeks are common in some manufacturing environments, the five day work week is still standard practice. Compressed work week schedules are relatively easy and inexpensive to implement and can achieve an immediate and significant reduction in automobile trips. However, employers are again concerned about worker productivity during 10 or 12 hour days. In some states, including California, worker protection legislation and union resistance make it difficult to implement compressed work week schedules even with employee and employer support.

Although work-at-home, telecommuting, and compressed work week schedules reduce commute trips, the effectiveness of these programs in reducing vehicle trips is uncertain. A recent study indicated that employees actually make more automobile trips

on their day away from the work site than on a normal work day (Ho and Stewart 1992, 6). However, these trips are generally shorter than commute trips and are made during non-peak hours.

In the past, flexible or staggered work schedules were considered an option to reduce traffic congestion. Public agencies and employers believed that allowing employees to start work at varying times would reduce peak hour traffic congestion. However, in areas with rapid growth, initial reductions in traffic congestion were quickly consumed by an increasing number of drivers.

There is also considerable debate about the effect of flexible work hours on the use of commute alternatives. In some cases flexible work hours seem to reduce commute alternative use because employees who work non-standard hours have fewer potential carpool partners and less transit options. However, advocates of flexible work schedules maintain that employees can arrange their schedule to accommodate carpool partners or transit schedules.

Although alternative work arrangements are considered a trip reduction strategy, it is likely that these strategies will be implemented based on factors other than their potential to reduce commute trips. For example, flexible work schedules have gained widespread acceptance as a valuable employee benefit. Similarly, work-at-home, telecommuting, and compressed work week schedules are more likely to be implemented for their quality of life benefits to employees than for their potential to reduce commute trips.

The Controversy

Although employer-based trip reduction programs are becoming widespread, they are not without controversy. Many opponents of mandated employer-based trip reduction programs argue that employers should not be responsible for their employees' driving

habits. Some opponents maintain that the goals set for employer-based trip reduction programs are not achievable. Other detractors contend that even if the trip reduction goals are achieved air quality improvements will be negligible because commute trips generally account for only 20-25% of vehicle trips.

For example, Southern California's Reg XV impacts only commute trips made to large employers' work sites, thus limiting the potential impact of Reg XV to about 10% of the daily trips made in the region. Therefore, a 25% increase in vehicle occupancy would result in at most a 2-3% decrease in automobile trips in the region, a reduction that is easily outstripped by a few years population growth in the region. Proponents of market based measures point out that such measures would have much greater impact by affecting all automobile trips.

Opponents of employer-based trip reduction programs argue that there are more cost effective ways to improve air quality. The Santa Clara County Manufacturing Group (SCCMG) estimates that employers in the county will spend $60 million per year to comply with BAAQMD's Reg 13-1. Based on BAAQMD's estimates of air emission reductions this cost translates to $1 million per ton of pollution reduction. By comparison the SCCMG estimates that the cost to reduce a ton of pollutants from industrial sources is $10,000 to $15,000 per year. The cost of employer-based trip reduction programs is a particularly sensitive issue in California where business expenses are already significantly higher than other areas of the nation and several key industries are facing difficult economic times.

CHAPTER 5

EMPLOYER BASED TRIP REDUCTION PROGRAMS: RESEARCH AND CASE STUDIES

Research in the field of employer-based trip reduction has increased dramatically in recent years in response to the many questions surrounding the effectiveness and costs of employer-based trip reduction programs. However, high quality research in the field is still scarce and in many cases research studies have uncovered more questions than they have answered. Some of the most recent and comprehensive research is discussed in this section.

The United States

A detailed study of 22 work sites throughout the nation found that the most important components of a successful employer-based trip reduction program are parking charges and restrictions, financial incentives, and support of carpooling (United States Department of Transportation 1992, Part III 34-36). An interesting result was that employer size and location density were not important factors in determining program effectiveness (United States Department of Transportation 1992, Part III 32-33). These findings contradict two common perceptions about employer-based trip reduction: 1) that small employers will be unable to implement effective trip reduction programs at reasonable costs and 2) trip reduction programs are only effective in high density areas where transit is available.

Another important finding was that companies with parking charges had the most cost effective programs. Parking charges are not only highly effective, but also generate revenue that can be used to fund other components of the employer-based trip reduction program. In fact, many of the most effective programs were operated at no net cost to the employer.

Southern California

The Los Angeles air basin, consisting of Los Angeles, Orange, Riverside, and San Bernardino counties, has the dubious distinction of having the worst air quality and many of the most congested highways in the United States. In 1987 the South Coast Air Quality Management District (SCAQMD) enacted Regulation XV (Reg XV) requiring employment sites with 100 or more workers to develop and implement trip reduction programs to encourage commuters to consider alternative to driving alone. The goal of Reg XV is to increase peak period vehicle occupancy by approximately 25%. Under Reg XV employers are free to choose any combination of trip reduction strategies to achieve their trip reduction goals.

Many of the concerns about employer-based trip reduction have been confirmed to some extent by the experiences in Southern California where employers spend an average of $75 per employee each year on trip reduction programs and most employers have not met trip reduction goals (Stewart 1992, 7). Many Southern California employers now have 3-4 years experience with trip reduction programs and yet there are no clear answers as to which trip reduction strategies are most effective. Studies of Southern California trip reduction programs have found no correlation between the amount of time and money spent on a trip reduction program and program effectiveness (Stewart 1992, 11). In addition, strategies do not appear to be transferable from site to site. Strategies that are effective at one work site are not necessarily effective at another work site.

An evaluation of Average Vehicle Ridership (AVR) at 5,640 employer sites demonstrates that Reg XV has increased vehicle occupancy, but at a much slower rate than desired (Christiansen and Young 1992, 5). Among employers who have two or more approved plans, which corresponds to at least one full year of program implementation, AVR has increased from 1.23 to 1.25 (Christiansen and Young 1992, 5). Employers who

have three approved plans, which corresponds to at least two full years of program implementation, have achieved an average AVR of 1.31 (Christiansen and Young 1992, 5). AVR progress among these employers is due almost entirely to increases in carpooling (Christiansen and Young 1992, 5).

The effectiveness of parking charges has been demonstrated by other Southern California case studies. Twentieth Century Insurance Company in the West San Fernando Valley of California previously had fully subsidized employee parking. Twentieth Century paid approximately $540 per year for each parking space. In 1988, Twentieth Century implemented a trip reduction program designed to increase ridesharing. The program included transit and vanpool subsidies, rideshare matching assistance, and preferential parking for carpoolers. Prior to implementing the program Twentieth Century's AVR was 1.10. After implementing the program, the AVR did not change. Twentieth Century decide to charge solo commuters $30 a month for parking. Carpools could continue to park free. In return the company would provide a guaranteed ride home for employees with personal emergencies. In the first two weeks 170 carpools were formed. Two months after implementing the program, Twentieth Century's AVR had risen to 1.46 (Pratt 1993, 15)

A study of trip reduction strategies of 37 Southern California employers with the most successful trip reduction programs revealed that the most common strategies were prizes, preferential parking, on-going transit subsidies, and a guaranteed ride home service (Stewart 1992, ii). The least frequently implemented strategies were parking management, transportation allowances, and child care centers (Stewart 1992, ii). Trip reduction strategies that are widely accepted to be effective and low cost, including compressed work weeks and parking charges, have not been widely implemented in Southern California. This indicates that other factors besides cost, such as union opposition, labor laws, or

employee and management opposition, influence an employer's choice of trip reduction strategies.

Investment in trip reduction programs among the 37 employers studied ranged from $6 to $450 per employee per year with small and medium-sized employers spending more per employee than large employers (Stewart 1992, iii). This study indicates that there are certain fixed costs, particularly staff time and training, associated with implementing a trip reduction program that may place a larger financial burden on small employers. Staff salary was the cost category that received the largest percentage of total investment. The second largest investment category was direct incentives to commuters.

Overall, employer-based trip reduction programs are changing employees driving behavior in Southern California. The use of transportation alternatives among employees at companies with trip reduction programs is higher, 27% compared to 18%, than among employees who work for companies that are not required to implement programs (Commuter Transportation Services 1993, 4). Perhaps the most positive outcome of the Southern California experience is that several employers have achieved significant reductions in drive alone rates at relatively low costs. These cases demonstrate the potential of employer-based trip reduction programs.

The San Francisco Bay Area

The San Francisco Bay Area is a nine county region located around the San Francisco Bay in Northern California as shown in Figure 3. Census data reveals that the region experienced significant growth from 1980-1990 with a population increase from approximately 5 million to 6 million people. The majority of the growth, 80%, occurred in outlying suburban areas (Metropolitan Transportation Commission 1992, 2.) Higher growth rates in suburban communities, where transportation options are limited, have resulted in an increase in both the number of highway users and average commute distances.

Figure 3. The Nine County San Francisco Bay Area.
(Source: Bay Area Air Quality Management District)

The Current Commute Picture. In May 1993, Rides for Bay Area Commuters (RIDES) conducted a random telephone survey of 2800 commuters. The purpose of the survey was to determine how Bay Area residents commute to work and the factors that affect their commute choices.

The survey revealed that 65% of Bay Area commuters drive alone to work (Rides for Bay Area Commuters 1993, 4). San Francisco county has the lowest drive alone rate in the Bay Area at 40% and Santa Clara County has the highest drive alone rate at 78% (Rides for Bay Area Commuters 1993, 4). The low drive alone rate in San Francisco correlates to high transit use of 25%. Carpooling is the most used alternative in the region with 16% of Bay Area residents choosing this mode (Rides for Bay Area Commuters 1993, 4).

The average one way commute distance in the Bay Area is 15 miles (Rides for Bay Area Commuters 1993, 9). Over 35% of employees live within 5 miles of work. The drive alone rate is highest among commuters who live 6-20 miles. At these distances walking or bicycling may not be feasible and carpooling or transit may not seem worth the effort to the commuter. The average commute time is 26 minutes in morning and 28 minutes in evening.

The survey revealed that lack of awareness of alternatives and services does not appear to be a major issue inhibiting the use of commute alternatives. Eighty-eight per-cent of solo drivers were aware of transit alternatives they could use and 64% were aware of carpool numbers they could call for assistance (Rides for Bay Area Commuters 1993, 28).

When asked what factors determine their commute decision, solo drivers most frequently stated that they "have no other option." Solo drivers also responded that "convenience and flexibility" and "irregular work hours" influence their decision to drive

alone. Interestingly, among carpoolers and transit users "convenience and flexibility" was the most frequent reason for choosing their commute mode. "Commuting costs" and "no other options" were also important factors to both carpoolers and transit users.

When solo drivers were asked what factors would encourage them to change modes, the most common response was "nothing, couldn't get me to rideshare [sic]" (Rides for Bay Area Commuters 1993, p 25). Seventeen percent stated they would switch if transit was improved and 13% would switch if there were more people they could carpool with (Rides for Bay Area Commuters 1993, 25).

Only seven percent of respondents indicated that economic factors, such as an increase in the cost of driving or a decrease in the cost of transit, would encourage them to use an alternative mode (Rides for Bay Area Commuters 1993, 25). However, 27% of solo drivers said that a $20 subsidy from their employer to carpool, vanpool, or use transit would influence their behavior (Rides for Bay Area Commuters 1993, 26). There appears to be a declining return associated with employer subsidies given that only an additional 21% of the remaining solo drivers said a subsidy of $60 would influence their commuting behavior (Rides for Bay Area Commuters 1993, 26).

The majority of commuters, 78%, have access to free parking. These employees are much more likely to drive alone than employees who must pay for parking, 72% compared to 37% (Rides for Bay Area Commuters 1993, 22). However, it is difficult to separate the impact of paid parking from the impact of transit availability because most areas that have paid parking also have well developed transit systems.

Reg 13-1 applies to employees who arrive between 6-10 a.m.. In the Bay Area, 80% of employees arrive during this peak time. The drive alone rate is highest among those employees who arrive at the early and late ends of the peak commute hours. These employees have less motivation to use alternatives because they are usually not faced with

serious traffic congestion. In addition, employees who commute earlier or later than the majority of commuters have less transit options and fewer potential carpooling partners.

Demographic factors that were investigated include job classification, age, income, ethnic background, and education. Maintenance workers were most likely to drive alone and clerical workers were least likely to drive alone. In general, as people get older they are more likely to drive alone. As income rises people are less likely to use transit and more likely to carpool. Transit use is highest among African-Americans and carpooling is highest among Asians and Hispanics. An individuals level of education did not correlate to mode choice.

In 1991, the Bay Area Council conducted a poll of 630 Bay Area residents to investigate how much and in what form residents would be willing to pay for clean air (Bay Area Council 1991). Ninety-four percent of respondents were willing to pay 5 cents more per gallon for gasoline and 84% were willing to pay 10 cents more. Sixty-five percent said they were willing to pay an additional $1 for bridge tolls. Forty-nine percent said they were willing to pay highway tolls. Only 24% were willing to accept driving on only odd or even days. The Bay Area poll also revealed that residents consider transportation a much more serious problem than pollution with nearly 35% of residents listing transportation as the most important problem facing the Bay Area compared to 8% listing pollution as the most serious problem. This indicates that commuters may be more likely to respond to strategies designed to improve mobility than those designed to improve air quality.

Employer-based trip reduction programs. The percentage of employees who drive alone is lower than average at Bay Area employers who have active trip reduction programs (Brock 1992, 20). Employees who said their employers offer carpooling assistance are almost twice as likely to carpool than employees who receive no assistance from their

employer (Brock 1992, 20). Employees who receive transit subsidies from their employers are more likely to use transit, 21.9% compared to an average of 12.6% (Brock 1992, 22). However, it is not clear whether this is primarily because transit subsidies increase transit ridership or because employers are more likely to offer transit subsidies in areas that are well served by transit.

In 1992 RIDES recognized 100 Bay Area employers for their efforts to reduce solo driving. The drive alone rate of the 100 employers is almost 10% lower than the region's average (Rides for Bay Area Commuters 1993, 8). Seventy percent of the companies sell transit passes at the work site and 47% subsidize transit use. In addition, 49% partly or fully fund shuttles to transit stations. Seventy-one percent offer preferential parking for carpoolers. Sixty-eight percent provide in-house ridematching. Fifty-seven percent offer a guaranteed ride home.

A study of commute mode choice at selected Bay Area work sites revealed that drive alone rates are highest in areas where parking is free and abundant (Burch 1990, 2). Work sites in downtown San Francisco and Oakland typically have drive alone rates of less than 50%, while suburban work sites in the region typically have drive alone rates of 80-90% (Burch 1990, 2). In addition, it appears that it is difficult to maintain high rates of commute alternative use in an environment of free and abundant parking. There is some evidence to suggest that in suburban areas where aggressive trip reduction programs have successfully reduced drive alone rates, it is very difficult to maintain gains in commute alternative use (Burch 1990, 19). It is suggested that employees who initially shift from their single occupant automobiles to carpools or transit are eventually tempted to revert to driving alone.

A detailed study of trip reduction programs at suburban Bay Area employment sites evaluated the strategies employers use to reduce automobile use in environments with

limited transit and abundant free parking (JHK & Associates 1992). The drive alone rate at these suburban work sites was 78.3% (JHK & Associates, 11). Carpooling had the second highest level of participation at 12.5% (JHK & Associates, 11). Base line data was not available to determine gains made by the employers' trip reduction efforts.

The most commonly offered strategies among the employers studied were commute information, bike lockers and showers, flex time, and preferential parking. In this study, a computer model was used to evaluate the cost effectiveness of various commute strategies. According to the model the most cost effective strategies in a suburban environment are the reduction of parking subsidy and supply. However, the study does not attempt to address the difficulties associated with parking management in a suburban environment, such as employee resistance, monitoring and enforcement, and spill-over parking onto nearby streets. Other cost effective strategies include ridematching services, guaranteed ride home, compressed work hours, preferential parking, and commute information. The most expensive strategies were home-based telecommuting, transit pass subsidies, bike lockers and showers, vanpool programs, direct monetary incentives, and shuttles to transit.

CHAPTER 6

THE COMMUTE PICTURE IN SANTA CLARA COUNTY, CALIFORNIA

Santa Clara County, California has been chosen for in-depth study of employer-based trip reduction programs. However, in order to evaluate trip reduction programs in the county it is first important to understand the transportation environment.

Background

Santa Clara County as shown in Figure 4 is located at the south end of the San Francisco Bay. The county encompasses more than 1,300 square miles. The county is the largest in the Bay Area with a population of 1.5 million. San Jose is by far the largest of 15 cities in the county with a population of nearly 900,000.

Santa Clara county is the home of what is commonly referred to as Silicon Valley. Located in the northern part of the county, Silicon Valley contains the nation's largest concentration of high technology industries including computers, semiconductors, communications, and aerospace. Over 25% of the county's work force is employed in these industries.

The majority of Santa Clara County was developed during the era when planners intentionally separated work sites from residences. Most Santa Clara County employers are located in suburban-style office parks. These work sites are often characterized by abundant free parking, limited transit service, limited bicycling and walking access, and limited support services such as restaurants and shopping.

The Transportation Environment

Local policies in the 1950s and 1960s led to sprawling, low density development throughout the county. During this time roadway expansions and improvements generally kept pace with the increasing transportation demands caused by population growth in the

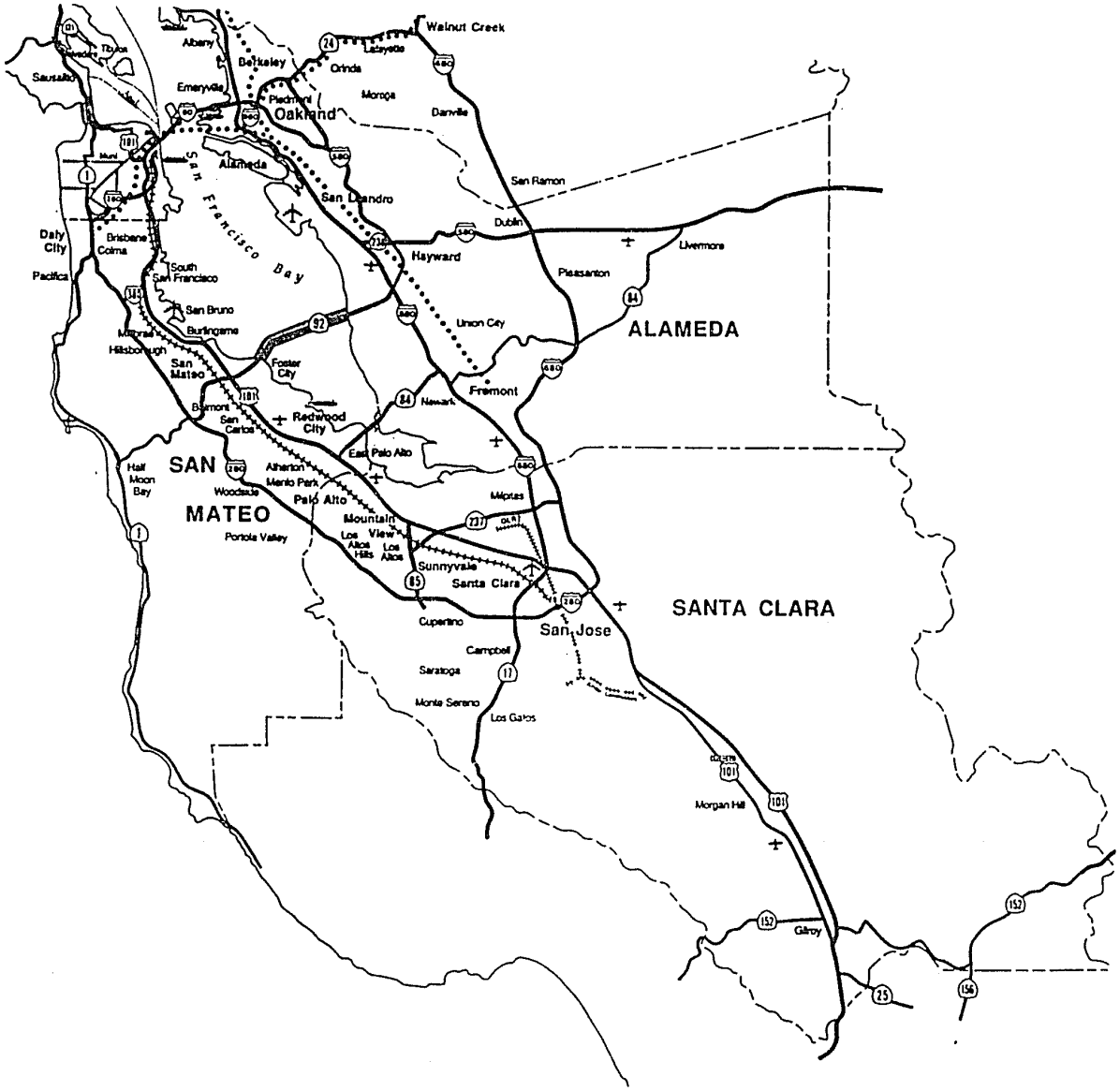


Figure 4. Santa Clara County, California.
(Source: Metropolitan Transportation Commission 1987).

region. However, in recent decades transportation improvements have lagged behind population growth, primarily due to revenue shortfalls resulting from relatively flat gasoline taxes and more fuel efficient vehicles. For the past decade the majority of available funding has been consumed by the maintenance requirements of the existing roadway infrastructure. In the face of continuing population growth this lack of new roadway capacity has led to a significant increase in traffic congestion in the county. The California Department of Transportation (Caltrans) estimates that traffic congestion will increase by 25-40% on many highways and expressways in the county by the year 2000.

The Road System. Highways 101, 880, and 280 are the primary highways serving Santa Clara County as shown in Figure 4. Secondary highways, which are currently being upgraded include Highway 85 and Highway 237. The county also has several expressways serving cross town travel. Traffic congestion is common on all highways, expressways, and many surface streets during peak commute hours. In addition, surface streets and intersections near major employment sites are often congested during the lunch hour. Minor accidents and road construction often result in severe traffic congestion.

Santa Clara County has the most miles of high occupancy vehicle (HOV) lanes, commonly referred to as carpool or diamond lanes, in the Bay Area. Figure 5 shows current and soon to be completed carpool lanes in Santa Clara County. Although there is public perception that the carpool lanes are under utilized, Caltrans data indicates that carpool lanes carry more people per hour during peak hours than a standard highway lane. Santa Clara County will eventually have 170 miles of carpool lanes and supporting facilities, such as ramp-meter bypass lanes, connection ramps, and enforcement areas.

Parking. Parking is generally free and abundant throughout the county. Parking is free at most work sites and shopping facilities. Paid parking is limited primarily to downtown San Jose and at special events.

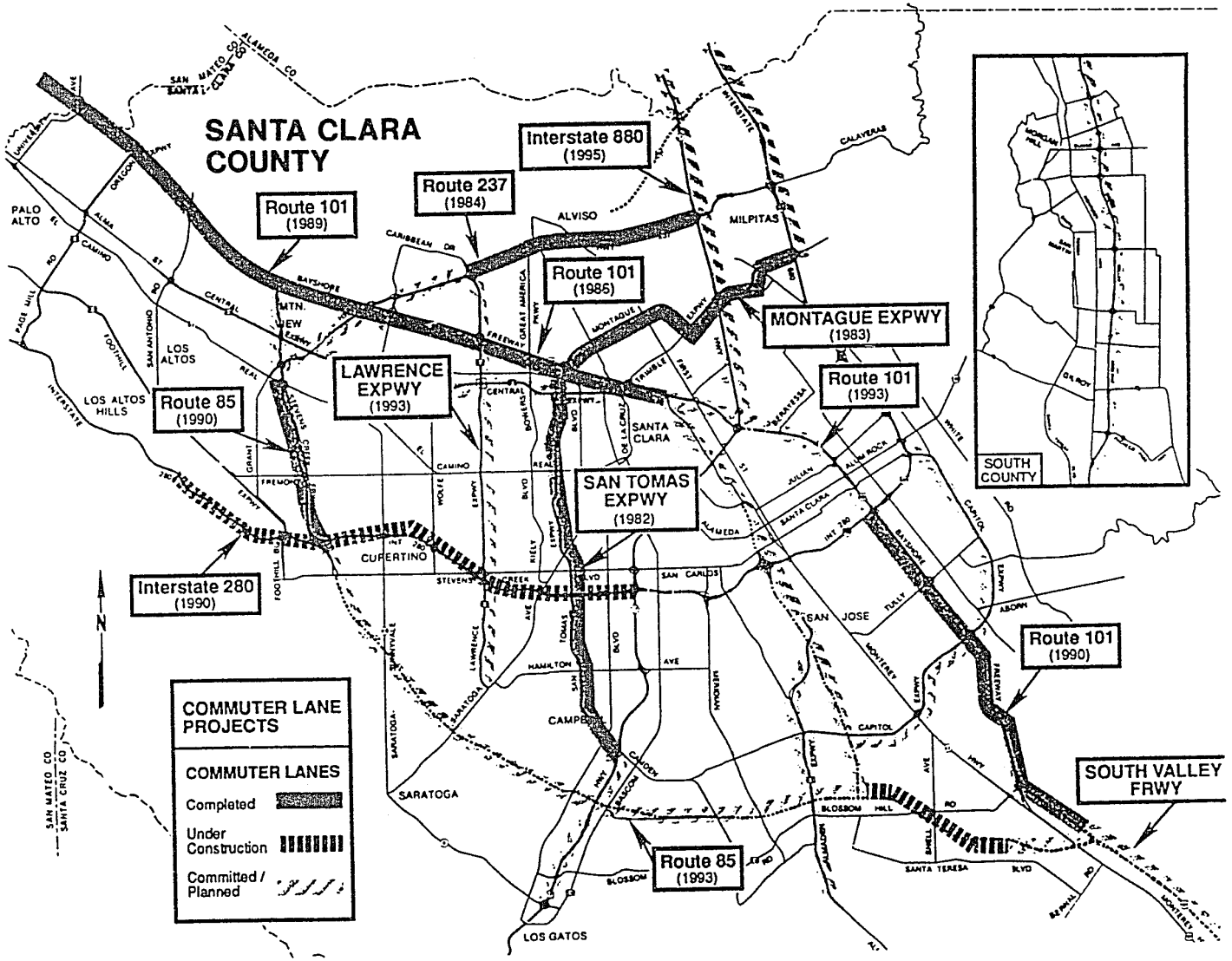


Figure 5. Santa Clara County Carpool Lanes
(Source: Santa Clara County Transportation Agency 1990)

Transit. The west side of the county is served by CalTrain commuter rail. However, CalTrain service was primarily designed to transport commuters from Santa Clara and San Mateo counties to San Francisco. In recent years increased priority has been given to designing service to transport employees to work sites in Santa Clara County. Train service recently expanded south to Gilroy.

A light rail system emanating from the downtown San Jose area currently serves a limited area of the county. The system is scheduled for expansion with new lines planned to open as early as 1998. Figure 6 shows planned rail expansions in Santa Clara County. However, funding issues may delay these projects. Although both CalTrain and the light rail systems are relatively fast and inexpensive transit options, the use of these systems by commuters is greatly limited by the lack of proximity to residences and work sites.

The Santa Clara County Transportation Agency operates bus service in the county. Bus trips in the county are often time consuming due to limited service and the high number of stops and connections that are characteristic of low density urban areas. In the past three years, bus service has been significantly reduced due to funding shortfalls resulting from lower than expected sales tax revenue in the county.

The Work Environment

The majority of large employers in Santa Clara County are involved in high-technology industries, such as computers, telecommunications, and aerospace. Since much of the manufacturing that was previously located in the county has relocated to locations with lower labor costs, the remaining employees at many high-technology companies are engineers and researchers, customer support and marketing staff, and administrative support. Many employers have a large percentage of high income workers, which can reduce the effectiveness of incentive and disincentive strategies.

Many work sites offer flexible hours and many employees work irregular hours. This is significant because flexible and especially irregular work schedules appear to hinder

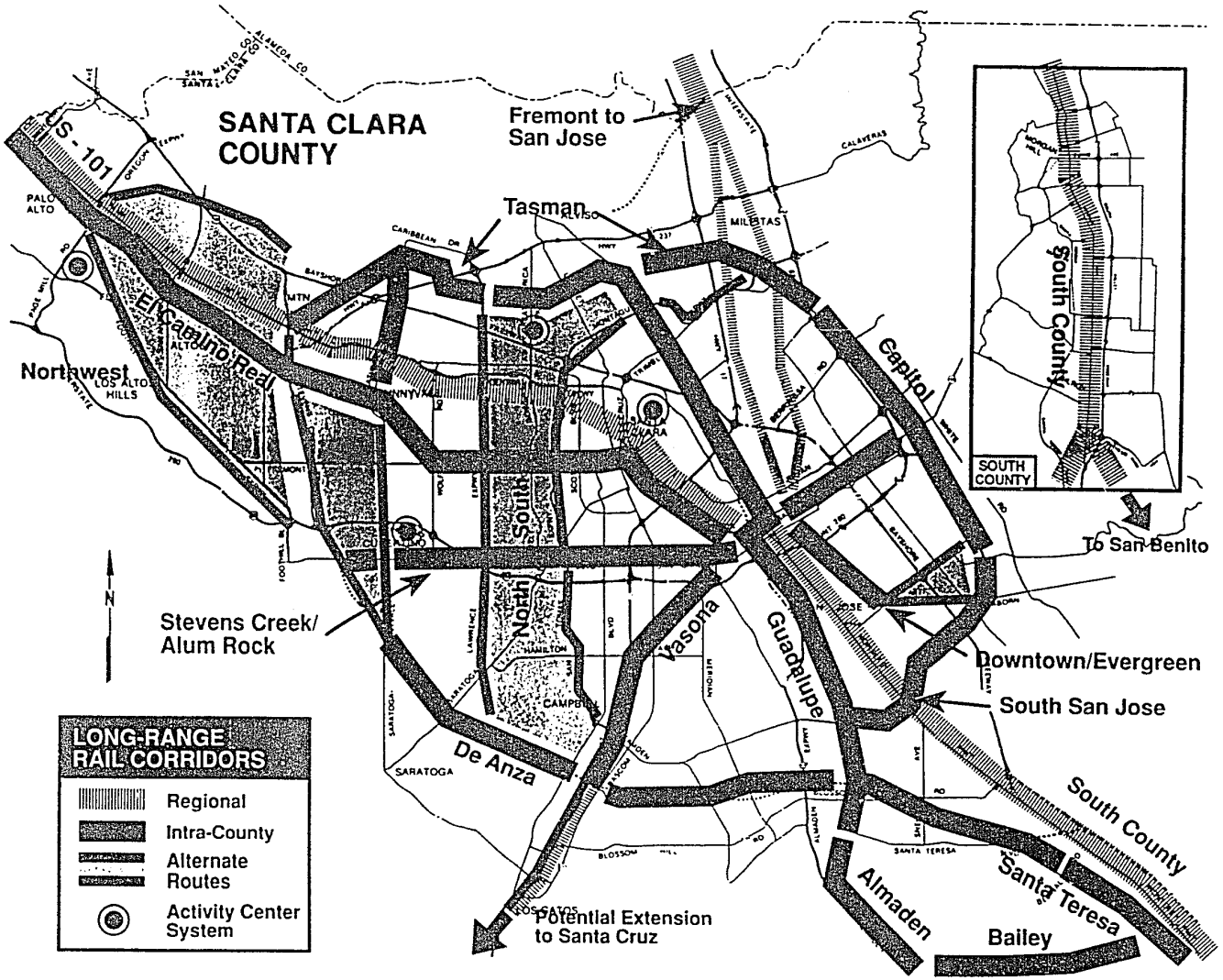


Figure 6. Planned Rail Expansions for Santa Clara County
(Source: Santa Clara County Transportation Agency 1991)

the use of commute alternatives by making it more difficult for employees to carpool and use transit options. In addition, many companies in the county have corporate cultures that encourage long work days. For many employees a 60 hour work week is more standard than a 40 hour work week. Employers who already receive 10-12 hour work days, 5 days a week from their employees are unlikely to implement compressed work week schedules that could result in fewer work hours per week.

Casual dress codes are common among Santa Clara County employers. Casual dress can encourage bicycle commuting and walking among employees.

The high percentage of Santa Clara County employees who work directly with computers and own personal computers for home use provides some interesting opportunities. Telecommuting is an attractive and viable commute option for many employees. In addition, electronic mail systems provide an easy and efficient way for employee transportation coordinators to communicate information to employees.

Difficult economic times have had an impact on many Santa Clara County employers. Many large employers, such as Lockheed, Hewlett-Packard, IBM, and FMC have been permanently down sizing their work force for several years. Other companies, such as Apple and Tandem have recently implemented dramatic cutbacks. Companies experiencing economic difficulties often reduce the staff and funding dedicated to employer-based trip reduction programs. These employers knowingly choose to make the minimal effort required to comply with trip reduction regulations. However, other employers in the county are experiencing rapid growth and should have adequate resources to implement effective employer-based trip reduction programs.

Trip Reduction Regulations

Employers throughout the nine county Bay Area region with more than 100 employees must comply with Regulation 13, Rule 1: Trip Reduction Requirements for Large Employers beginning in July 1994. Nearly 1000 employers in Santa Clara County

will eventually be required to implement employer-based trip reduction programs to comply with Reg 13-1. Employers must comply with the following requirements:

- Register with the BAAQMD
- Designate an Employee Transportation Coordinator (ETC)
- Designate a Program Manager
- Notify employees of Reg 13-1
- Survey employees
- Implement an Employee Trip Reduction Program

In addition the BAAQMD has set Average Vehicle Ridership (AVR) performance objectives for employers as shown in Table 3. AVR objectives have been set for four geographically defined zones to reflect current and potential commute alternative use. Santa Clara County is in Zone 3 with a final AVR target of 1.35.

Table 3. Average Vehicle Ridership Standards for Bay Area Employers

Zone	1993	1994	1995	1996	1997	1998	1999
Zone 1	1.50	1.65	1.80	2.00	2.20	2.50	2.50
Zone 2	1.20	1.26	1.32	1.38	1.44	1.50	1.50
Zone 3	1.10	1.15	1.20	1.25	1.30	1.35	1.35
Zone 4	1.05	1.10	1.15	1.20	1.25	1.30	1.30

Source: Bay Area Air Quality Management District 1992, p. 19.

Current Commute Characteristics

The average one-way commute for Santa Clara County employees is 13 miles and is completed in slightly over 20 minutes (RIDES 1993, p. 9). Both commute distance and

commute distance and time are below the Bay Area regional average.

Seventy-eight percent of Santa Clara County commuters drive alone to work (Rides for Bay Area Commuters 1993, 6). Carpooling is by far the most frequently used commute alternative with 15% of employees carpooling (Rides for Bay Area Commuters 1993, 4). Approximately 3% of Santa Clara County employees bicycle or walk to work. Approximately 3.5% of employees ride some form of transit, which is far below the regional average of 12% (Rides for Bay Area Commuters 1993, 4). Santa Clara County employees are the most likely in the Bay Area to have free parking. Santa Clara County residents are least likely to be aware of transit alternatives and carpool ridematching services. The most important factor in determining commute mode choice for Santa Clara County commuters is travel time.

Employee Needs

In 1991, the Golden Triangle Commuter Network required employers with 1000 or more employees in the cities of Palo Alto, Mountain View, Sunnyvale, Milpitas, and the Northern area of San Jose to survey employees about commute practices and needs. Nearly 27,000 employees were surveyed. The highlights of the survey results are discussed below and detailed results are compiled in Tables 4 through 9 in Appendix A.

Employees who currently drive alone to work were most likely to consider carpooling as an alternative. Employees responded that a guaranteed ride home, flexible work hours, subsidies, and assistance finding carpoolers would be most likely to encourage them to use a commute alternative. Employees were less interested in assistance with transit and preferential carpool parking.

When asked to identify obstacles to using a commute alternative, 41% responded that their work schedule is too irregular. Irregular work hours make it difficult to arrange carpools and limit transit options. Irregular work hours appear to be a particularly signifi-

cant factor in Santa Clara County where many employers offer flexible work schedules and many employees are expected to work as needed and often beyond a standard 40 hour work week.

Solo drivers in Santa Clara County are highly resistant to sacrificing the independence and security offered by the single occupant automobile. Nearly 40% of survey respondents stated that they "Do not like to depend on others." Employees again expressed concern about not being able to get home in an emergency and not having their car for personal business.

Eighty percent of employees rarely or never need their automobile during the day for business activities. However, 74% use their cars for personal business or lunch at least 1-2 times each week. Factors contributing to lunch time vehicle use include 1 hour lunch breaks, and the shortage of nearby dining, shopping, and service establishments.

Analysis

Santa Clara County is a difficult environment for employer-based trip reduction programs. Low density development, free parking, and lack of convenient transit service and safe bicycling and pedestrian access encourage automobile use. It is not surprising that Santa Clara County has the highest drive alone rate, 78%, in the Bay Area. However, worsening traffic congestion and air pollution that exceeds health-based standards make reducing automobile use a necessity. Beginning in July 1994 employers in Santa Clara County will be required to play a major role in reducing vehicle use by implementing trip reduction programs as required by Reg 13-1.

Work place cultures at Santa Clara County employers provide unique challenges and opportunities for trip reduction efforts. Santa Clara County employees state that irregular work hours are their biggest barrier to commute alternative use. Santa Clara County employees base their commute decisions primarily on travel time, perhaps due to

long and demanding work schedules.

Santa Clara County employees are most likely to consider carpooling as an alternative to the single occupant automobile. This is not surprising because carpooling is the only viable option for employees who are not served by transit and live too far to bicycle or walk. In addition, carpooling typically requires less travel time penalty than other options.

While good transit options exist for some employees, transit is not likely to play a large role in reducing commute trips in the near future. Although major transit expansions are planned for the county, the majority of these projects will not be completed until the year 2000 or later.

The large number of Santa Clara County employees who use computers on a regular basis provides unique opportunities for telecommuting, and employee communications and services related to trip reduction efforts.

Santa Clara County employees are resistant to giving-up the mobility, independence, and security associated with the single occupant vehicle. Employees use their vehicles for personal business during lunch breaks and before and after work on a regular basis. Limited dining and service establishments near work sites necessitate automobile use for these daytime trips.

A large percentage of employees resist commute options because they "Do not like to depend on others." Employees are also concerned about not having transportation in emergency and overtime situations.

It is critical that employer-based trip reduction programs be developed with full knowledge of the unique challenges and opportunities that exist in Santa Clara County. The availability and relative convenience of commute options, work place cultures, and employee needs must be carefully assessed and this information used to develop trip

reduction strategies that will best serve a particular work site. In this way obstacles can be overcome and opportunities maximized, resulting in effective and efficient employer-based trip reduction programs.

CHAPTER 7

EMPLOYER BASED TRIP REDUCTION PROGRAMS IN SANTA CLARA COUNTY

Background

A few Santa Clara County employers, including Lockheed, Hewlett Packard, and FMC, have had trip reduction programs in place for several years. Many of these long-standing programs were originally developed in the late 1970s in response to oil embargoes and the associated gasoline shortages. These early programs consisted primarily of providing carpool and vanpool formation assistance. These programs were continued as an employee service and community relations program.

In more recent years, employer-based trip reduction programs have been associated with new site development. In these cases, trip reduction programs were required by the cities as a condition for development approval. The primary goal of trip reduction programs at new work sites is to reduce local traffic problems associated with the new development. Apple Computer was required by the City of Cupertino to implement extensive trip reduction strategies as a condition of approval for a new research and development facility. Intel Corporation was required by the City of Santa Clara to implement a trip reduction program in conjunction with the construction of a new headquarters facility.

In the past 2-3 years, the majority of employer-based trip reduction programs in Santa Clara County have begun in response to local ordinances and the impending BAAQMD regulation.

Existing Trip Reduction Programs

Information about existing trip reduction programs in the Santa Clara County was collected from interviews with 17 employers. A list of the employers interviewed and the

interview questionnaire appear in Appendix B. The results of the interviews are summarized in Tables 10 through 22 in Appendix B. The highlights of the interview results are discussed below.

Staff. Staff time devoted to the trip reduction program ranges from 1 hour per week to 140 hours per week. Staff time to employee ratios are as high as 1 hour per employee per year to as low as .07 hours per employee per year. The average staff time among the employers interviewed is .48 hours per employee per year. These figures do not include staff directly involved with the operation of shuttles because in most cases shuttle service is provided by outside vendors.

Companies with more than 4000 employees are likely to have a full time employee transportation coordinator. However, difficult economic times and delays in the implementation of Reg 13-1 have resulted in previously full-time coordinators being assigned other responsibilities. Staff hours spent on trip reduction programs have recently been reduced at Apple and Tandem in conjunction with recent company-wide down sizing. One of the most dramatic reductions in trip reduction staff occurred at Sun Microsystems where staff was reduced from 2 full-time employees to 1 part-time employee. Although company-wide budget constraints were a factor, the transportation manager at Sun believes the delay in the implementation of Reg 13-1 is the primary reason for the staff reduction.

Employee transportation coordinators most frequently work in human resources, facilities, or environmental departments. Part-time coordinators have a variety of other responsibilities including employee relations, cafeteria management, and coordination of recycling programs.

On-the-job training is prevalent. All the employee transportation coordinators interviewed had no prior experience in the field of employer-based trip reduction pro-

grams.

Budget. Five of the 17 coordinators interviewed could not provide information about program costs for confidentiality reasons. Four employers do not have official budgets for the trip reduction program, but are able to obtain small amounts of funding on an as-needed basis. Smaller employers and employers with new trip reduction programs are less likely to have official budgets for their programs.

The program costs for employers who did provide cost information ranged from $10,000 to over $1 million annually. Lockheed spends over $1 million annually on their trip reduction program. However, it is important to note that this figure includes extensive on-site shuttle service.

When identifying costs most coordinators did not include staff time. The lack of cost data and inconsistency of the data provided make it impossible to quantitatively evaluate the cost of the employers' trip reduction programs. However, most coordinators were able to specify which components require the largest portion of funding. Six of the 17 employers identified shuttles as one of their most expensive program components. Six employers identified transit subsidies as one of their most expensive program components. Staff time and incentive programs were also identified as most expensive components.

Common Strategies. The strategies adopted by the employers interviewed are shown in Tables 12 through 18 in Appendix B. The most commonly implemented strategies include information and promotion, carpool ridematching, transit pass sales and subsidies, awards and prize drawings, guaranteed ride home, informal telecommuting, bicycle parking and shower facilities, and on-site services.

All employers interviewed have some form of on-site information center where employees can obtain transit schedules, bike maps, and carpooling information. All employers promote commute alternatives on a regular basis with a variety of communica-

tion methods including electronic mail, newsletter articles, and bulletin board displays. Most employers participate in one or more promotional campaigns, such as Spare the Air, Bike to Work Day, and Beat the Back-up.

Although most employers offer some form of carpool ridematching assistance, the type, quality, and the potential effectiveness of the services varies dramatically. Many employers utilize RIDES carpool matching service and provide their employees with RIDES mail in forms or fax-a-match forms. Some coordinators simply display the ridematching forms at an on-site location and rely on employees to pick them up. Other coordinators mail matchlists applications to each employee and offer a small incentive or prize drawing for employees who request matchlists. RIDES recently began offering on-site access, which enables a transportation coordinator to access the RIDES database and immediately generate a carpool matchlist for an employee.

Several employers including Apple, Intel, Lockheed, and Sun Microsystems, have developed in-house carpool databases. The prevalence of employer-developed carpool databases is unique to Santa Clara County and due primarily to the fact that many large employers produce computer software or equipment and have staff who can easily develop a database. At Intel and Lockheed the carpool database is operated by the transportation coordinator and a matchlist is sent to the employee. At Apple and Sun the employee can access the carpool database directly.

Many employers devote a large amount of staff and budget resources to on-site transit pass sales and transit subsidies. Eleven of the 17 employers offer on-site transit pass sales. On-site transit pass sales are designed to make it convenient for employees to purchase monthly passes, which are significantly less expensive than daily fares. Eleven employers provide transit subsidies. Transit subsidies can help overcome employee perception that transit is more expensive than driving. Among the companies who subsi-

dize transit use, most offer a $20 per month subsidy, although Alza provides up to $60 per month. However, many coordinators do not think transit pass sales and subsidies have significantly increased the number of employees who commute by transit. Instead they believe pass sales and subsidies are used primarily by employees who already used transit. The regional manager at Hewlett-Packard views the company's transit subsidy program primarily as a reward for existing transit riders, not as a incentive to attract new riders. Given this one might wonder why so many employers offer transit pass sales and subsidies. Several factors including persistent employee requests, public agency promotion and support, and a tax credit that reduces the actual cost of the subsidy to the employer have contributed to the prevalence of transit pass sales and subsidies.

Many employers offer awards and prize drawings as incentives to encourage employees to try and continue using commute alternatives. In many cases, awards and prize drawings are offered in conjunction with a special promotion, such as Beat the Back-up or Bike to Work Day. Awards and prizes range from water bottles and T-shirts to bicycles and Hawaiian vacation packages. Awards and prize drawings are viewed as an effective way to generate employee interest in commute alternatives and can be much less expensive that continuous incentives or subsidies, particularly since vendors are often willing to donate prizes.

Eleven employers currently offer a guaranteed ride home service and several other employers are considering offering this service in the near future. The goal of a guaranteed ride home program is to eliminate a major employee concern about using commute alternatives, namely concern about being stuck without transportation in case of personal emergency or unanticipated overtime. In these situations, the company provides transportation for an employee who does not have transportation because he/she used a commute alternative. Although the cost per incident is potentially high, the number of incidents per

eligible employee population is typically low. Most transportation coordinators said the service was used much less than they anticipated. Some employers offer a guaranteed ride home only for emergency situations because they are concerned about the frequency of unanticipated overtime in their particular work situation. Other employers control costs by limiting the number of times an employee can use the service in a year. Some coordinators view the guaranteed ride home service as a major component of their trip reduction program and market the service aggressively. Other coordinators keep the guaranteed ride home service more informal and low key to reduce the potential for abuse. Unfortunately, this approach also significantly limits the potential of the guaranteed ride home service to attract new commute alternative users.

Although nine employers have informal or limited telecommuting programs, only one company, Apple Computer, has a widely used, formal telecommuting program. Apple estimates that 25% of their work force participates in their telecommuting program. At other companies telecommuting arrangements are primarily arranged on a case-by-case basis between the employee and his/her manager. Even though the number of high technology companies in Santa Clara County make this a prime location for telecommuting and many local computer and telecommunications companies are aggressively promoting telecommuting as a trip reduction strategy, there appear to be significant obstacles to widespread acceptance of telecommuting. One transportation coordinator referred to telecommuting as a strategy that "everyone is talking about, but no one is doing."

Although research indicates that telecommuting increases employee productivity, many managers are still concerned about managing off-site employees. Unless an employee already has the equipment necessary to telecommute or the company can provide equipment at low cost due to some special circumstance, such as self manufacture or excess equipment due to down sizing, the start-up costs for telecommuting can be expen-

sive. Human Resource departments are concerned about equity issues because not all employees are candidates for telecommuting. Legal departments are concerned about liability issues related to worker compensation in cases of injury in the employee's home on telecommuting days. These barriers are significant enough to discourage most transportation coordinators from actively promoting telecommuting as a trip reduction program to management. Instead, many transportation coordinators are waiting for upper management to resolve many of the barriers and adopt a positive stance towards telecommuting.

All the employers interviewed have some form of bicycle parking and shower facilities that can be used by bicyclists. However, in most cases these facilities were not installed as part of the trip reduction program, but to comply with city site design guidelines at the time of construction. Because many bicycle racks are not secure and do not protect bicycles from the elements, some employers are upgrading bicycle parking specifically to meet the needs of bicycle commuters. Tandem and Apple have installed individual bike lockers. Sun Microsystems constructed a bicycle pen with security card access. Other employers have taken a low cost approach and allowed employees to park their bicycles in their office or in a secure, out of the way location in the building, such as under a stairwell.

Many employers have on-site services and facilities that can reduce employees' need for an automobile during the day and before and after work. Common on-site services and facilities include cafeterias and break rooms, fitness facilities, banking, and postal service. Some employers have also arranged for on-site pick-up and delivery for services, such as film developing, dry cleaning, and shoe repair. In most cases these services and facilities were not implemented as a trip reduction strategy, but as a service to employees. Large work sites and new work sites tend to have more on-site services and facilities. Employers appear to be willing to implement services as part of a trip reduction

program because many services require minimal effort and cost to set-up. However, employers are unlikely to justify major facility modifications, such as constructing an on-site cafeteria or fitness facility, for trip reduction purposes.

Least Common Strategies. The least common strategies among the employers interviewed are compressed work weeks, carpool and bicycling subsidies, vanpool programs, and parking charges.

Although compressed work week schedules can quickly achieve a significant reduction in vehicle trips at low cost, none of the employers have adopted this strategy for trip reduction purposes. The majority of compressed work week schedules are associated with manufacturing operations. A few employers have informal compressed work week schedules for other employees that have been negotiated on a case-by-case basis between the employee and his/her manager.

Most transportation coordinators do not actively promote compressed work week schedules to their management. Some coordinators feel that compressed work schedules are a personnel issue that must be addressed by the human resources or employee benefits departments. Many coordinators do not think management will be supportive of compressed work schedules. This is particularly true in work environments where salaried professionals routinely work 10-12 hour days, 5 or more days per week. Employers are concerned that they would receive fewer hours of work from salaried employees if they encourage them to work only 4 days each week. One coordinator specifically stated that "The company already gets 10-12 hour days from the engineers" and "There is no way management is going to encourage employees to work fewer days." The coordinators at Tandem and Hewlett-Packard mentioned that California Labor Code discourages compressed work schedules by requiring employers to hold employee votes or pay overtime for work hours in excess of 8 hours per day.

Although many employers offer subsidies to transit users, only two of the employers interviewed offered financial incentives to carpoolers, bicyclists, and walkers. Apple and Alza offer employees $1 for each day they carpool, bicycle, or walk to work. Many employers do not feel it is necessary to financially compensate carpoolers and bicyclists because these commuters typically do not incur significant, additional out-of-pocket expenses associated with their commutes, unlike transit users who must purchase daily or monthly passes. Offering financial incentives to carpoolers, bicyclists, and walkers can greatly increase the cost of an incentive program because 20-25% of the employee population may qualify for incentives. In addition, the federal tax code does not favor incentives for modes other than transit and vanpooling. An employer does not receive a tax credit for the incentives they give to carpoolers, bicyclists, and walkers, and the employees who receive these incentives must pay income tax on the full amount. In addition, monitoring, record keeping, and enforcement efforts associated with daily incentives for all commute alternative users can be time consuming.

Vanpooling programs were once common among employers with trip reduction programs. However, Watkins-Johnson is currently the only employer with a company operated vanpooling program and this program is available only to employees who were affected by a site relocation. In the past, employers who purchased and operated employee vanpools were eligible for significant tax credits. The tax code has since been changed to favor vanpools that are owned or leased directly by employees. In addition, employers are wary of liability issues associated with company-owned or sponsored vanpools.

Vanpool vendors and RIDES for Bay Area Commuters actively promote vanpooling to employers and employees in Santa Clara County. However, there seems to be limited interest in vanpooling and many of the vanpools that are formed soon disband

due to difficultly finding drivers and riders. The rigid structure of vanpools may not be compatible with the flexible and independent work cultures common in Santa Clara County. Many coordinators do not believe the limited potential of vanpooling justifies the effort and expense required to maintain successful vanpools. The coordinators at Tandem, Apple, and Hewlett-Packard worked together to form vanpools to their sites in Cupertino. After several meetings with public agencies, vendors, and employees one vanpool was formed. The vanpool soon disbanded due to lack of employee participation. This experience led one of the involved coordinators to state that "Vanpools are probably not worth the effort."

None of the employers interviewed charges employees for parking at the work site. This is not unexpected because paid parking is uncommon throughout the county and most work sites have abundant parking. While many coordinators acknowledge that paid parking is an effective strategy, most do not anticipate that their company will implement paid parking in the near future. The major barriers to paid parking are employee resistance and monitoring and enforcement issues. Many employers feel paid parking will have to be driven by government agencies. A few coordinators who publicly oppose parking charges have privately stated that they wish the cities or the air district would mandate work site parking charges. An ordinance or regulation requiring employers to charge for parking would enable employers to implement this highly effective strategy, while removing the responsibility from the employer. Cities will have to play a significant role in addressing potential spill over parking issues. Parking on public streets surrounding work sites will have to be controlled with meters or parking permits.

Program Effectiveness. Unfortunately, it is difficult to measure overall effectiveness due to limited data. Most employers do not have base line data and many have performed only one survey to measure AVR. Two employers were able to provide accu-

rate AVR data for 2 or more years. Intel Corporation, which is widely viewed as having a comprehensive trip reduction program, achieved a modest AVR increase from 1.15 in 1991 to 1.17 in 1992. Lockheed Missiles and Space Company, which has had a trip reduction program for 20 years, has achieved a relatively constant AVR of 1.19. It might appear that a constant AVR does not reflect a successful program, however the commute manager accurately pointed out that they have maintained employees' use of commute alternatives during a time when the use of commute alternatives has decreased significantly at both the regional and national level. Among employers who had only one year's data, AVR ranged from 1.12 to 1.21 with an average of 1.15. Several coordinators who did not have reliable AVR data estimated their AVR at between 1.1 and 1.2. Although data is limited, it is does not appear that employers' trip reduction programs to date have significantly reduced employee automobile use. The mandatory annual survey requirement of Reg 13-1 will provide accurate data for future assessments.

It is also not possible to quantify the effectiveness of individual program elements because employers have implemented several strategies at the same time and in many cases have not attempted to monitor the effectiveness of individual program elements. When asked what components they thought were most effective, 6 coordinators selected information and promotion, 5 coordinators chose carpool programs, and 4 coordinators chose personalized assistance. Four of the coordinators felt that transit subsidies and shuttles to transit are effective because these programs are being used by employees. However, these coordinators were quick to confirm that these strategies are the most costly.

Program Motivation. Among employers with long-standing programs the major reason for implementing a trip reduction program was to demonstrate corporate responsibility within the community and provide an employee service. Hewlett-Packard and Lockheed started programs in the 1970s in response to the energy crisis. Among employ-

ers who have implemented programs in the past 2-3 years the primary motivator was either ordinances and impending regulations or requirements associated with new construction. It can be expected that the majority of programs started in the future will be in direct response to Reg 13-1.

Most sites do not currently have any transportation related problems, although several programs were started in response to transportation related problems. These include Varian, who developed an extensive program in 1985 in response to a parking shortage, and Apple Computer, who developed a program in response to city requirements associated with the construction of a new research and development center. Several employers who anticipated they would have parking shortages or would need to construct new facilities in the future now have abundant parking and no expansion plans due to corporate down sizing.

Obstacles. The obstacles the transportation coordinators identified can be grouped into three categories: 1) internal to company, 2) external to company, or 3) behavioral. Common internal obstacles include lack of management support and lack of time and money. These internal obstacles are not independent because lack of management support often results in insufficient staff and financial resources. Coordinators also feel that work place cultures that encourage irregular hours are a major obstacle to the use of commute alternatives. External obstacles include lack of convenient transit options and bicycling and pedestrian access. Many coordinators feel that changing employee behavior is the biggest obstacle they face. These coordinators believe that their employees have negative attitudes and perceptions towards commute alternatives, resist change, and are unwilling to sacrifice their independence and security. The regional manager for Hewlett-Packard stated that "there is no perceived problem" reflecting her experience that employees do not perceive current levels of air pollution and traffic congestion to be serious enough prob-

lems to warrant a change in behavior.

Economic Factors. The economy has had a major impact on many trip reduction programs. Many coordinators stated that poor economic conditions have resulted in less time and money for the program than otherwise would have been available. The coordinator for Sun Microsystems responded that economic conditions at his company have had an "extensive impact" and that "the trip reduction program is a benefit that gets cut" in difficult economic times.

In addition, many coordinators believe that difficult economic times have adversely affected the use of commute alternatives among employees. At companies experiencing substantial layoffs carpools were broken-up when one or more of the participants lost their job. In addition layoffs often create a culture where remaining employees are insecure about their job status and feel they must work late and as needed, which hinders the use of commute alternatives. The commute manager at Lockheed summarized this best when she said "Long-term down sizing has created a chaos atmosphere." However, a few coordinators thought employees' financial concerns encouraged them to form carpools to save money.

Several transportation coordinators have intentionally switched to low-key promotions to reflect the economic times at their companies. The commuter coordinator at Intel, a company that has experienced tremendous financial success in recent years, stated that "Cuts in external resources, such as transit, are adversely affecting Intel's program."

Maturing Programs. Coordinators who have been involved with trip reduction programs at their companies for a few years see the programs becoming more focused and serious. They are less likely to devote efforts to strictly promotional events and more likely to develop tangible services and incentives. The coordinator at Varian said that the program is "less fru-fru" than in the past. Coordinators are shifting away from mass

marketing to all employees to target marketing employees based on commute needs and geographic location.

Plans for the Future. Many coordinators have general goals for the future, such as increasing employee participation and complying with regulations. Other coordinators listed specific program elements they wanted to implement, such as guaranteed ride home and on-line ridematching. Several coordinators believe that carpooling offers the best potential for meeting trip reduction goals and feel they need to significantly expand services and incentives to encourage carpooling.

Impact of Regulation

Reg 13-1 becomes effective in Santa Clara County on July 1, 1994. Many of the transportation coordinators believe that Reg 13-1 will provide credibility to their program and increase management support and funding. The coordinator at Acuson stated that "They will be forced to have a program and spend money on it." The coordinator at Sun responded that Reg 13-1 would improve Sun's program by "mandating minimum performance." Other coordinators who have long-standing programs or are implementing programs for other reasons, such as parking shortages or corporate policy, do not think Reg 13-1 will have much effect on their programs, except to require additional time and money to comply with the administrative requirements of the rule. The commute coordinator at Apple stated that the Reg 13-1 will "not effect Apple's program, except to require more time for tracking and surveying." This view was echoed by Intel's commute coordinator who said that the regulation "will not have much effect on Intel's program, but more effort will need to be put into surveying and preparing plans."

Most employers feel that they may be able to meet the AVR performance standards set by the air district for the first few years, but believe they will be unable to meet the final standard of 1.35. Employers who have had programs for several years and seen

only modest increases in AVR are most doubtful about meeting the standards. Smaller employers and employers who have only 1-2 years experience with a trip reduction program are most optimistic. One commute coordinator said "We could meet the AVR standards if we are forced to by the BAAQMD." This coordinator indicated that the company could meet the AVR standards by charging for parking at the work site, but they would not implement this strategy unless required to do so by the BAAQMD. A few employers who are certain they will not meet AVR standards are looking beyond employer-based trip reduction programs to alternatives strategies. The BAAQMD has expressed a willingness to accept alternative strategies, such as the conversion of company vehicles to clean fuels, as long as these strategies achieve emission reductions equal to those that would be achieved if the employer met the AVR standards.

Many employers are uncertain about how strictly the BAAQMD will enforce Reg 13-1. It is possible that the BAAQMD may simply encourage employers to implement basic, low cost strategies, such as information and promotion, carpool ridematching, and guaranteed ride home. However, the BAAQMD could require employers who do not achieve AVR standards to implement aggressive strategies, such as parking charges and financial incentives. Some employers are responding to this uncertainty by developing the best programs they can, while other employers have adopted a wait-and-see attitude. One coordinator stated that she is "not concerned about meeting the AVR goals because the air district does not have the resources to enforce the rule."

Summary

There is a tremendous variation in trip reduction programs among Santa Clara County employers. Some programs are aggressive, while others are minimal. A few programs have been in place for 10-20 years, while many have been implemented in the past 2-3 years. A few have programs have abundant staff and financial resources, while

other programs are maintained with minimal staff time and no financial resources. The status of current programs is largely determined by business needs, corporate philosophy, economic conditions, and the presence or absence of internal advocates.

Some of the employers interviewed have the most developed trip reduction programs in the Bay Area and have become models for employers throughout the region who are beginning new programs. However, even the employers with several years experience with trip reduction programs have achieved little, if any, reduction in employee vehicle use. This appears to confirm what opponents have maintained all along, that employer-based trip reduction programs are an ineffective and unnecessarily expensive way to address air pollution and traffic congestion problems. However, closer analysis reveals that there are abundant opportunities to enhance the effectiveness and reduce the cost of employer-based trip reduction programs in Santa Clara County.

One of the most interesting findings of the employer interviews is that many employers are spending the majority of resources on strategies that have limited potential to reduce vehicle use in Santa Clara County. This is most evident in the expenditures devoted to transit in the form of transit subsidies and shuttles to transit. In many cases employers are spending thousands of dollars on transit subsidies and shuttles and attracting few new riders.

Conversely, most employers have devoted few resources to carpooling strategies, which have a much greater potential to impact employee vehicle use in Santa Clara County. While some employers are simply unaware of the carpooling potential, many other employers are aware, but don't know how to develop an effective carpooling program. In many cases, transportation coordinators have simply gotten caught-up in other programs, such as transit subsidies and shuttles, and have little time left to develop and implement carpooling programs. However, this appears to be changing, as several trans-

portation coordinators specifically stated that their goals for the future include developing carpooling programs.

Santa Clara County employers have shown a willingness to support bicycle commuting with special events, seminars, services, facilities, and incentives. Two employers have bicycle fleets for on-site use. In some cases these programs have been implemented due to strong internal advocates. However, many transportation coordinators promote bicycle commuting because it meets employees' needs for flexibility better than other commute alternatives and appeals to fitness conscious employees. Year around good weather and flat terrain also make bicycling a logical choice for the area.

There are some strategies that are widely accepted to be effective, but are not commonly implemented in Santa Clara County and are not likely to be implemented in the near future. Even though employee parking charges have repeatedly proven to be a cost effective method of reducing employee vehicle use, none of the employers interviewed plans to implement work site parking charges unless they are mandated to do so. Employers believe that parking charges will be extremely unpopular with employees and require extensive monitoring and enforcement efforts.

Compressed work week schedules are another effective strategy that is not popular with Santa Clara County employers. The work place culture at many companies is such that 10-12 hour days are already common among salaried employees. Employers are concerned that implementing a 4 day work week would significantly reduce the weekly work hours of salaried employees.

Some strategies that are promoted for trip reduction purposes have other significant benefits to employers and/or employees and are likely to be implemented for these benefits. Although telecommuting is promoted as a trip reduction strategy, most instances of telecommuting among Santa Clara County employers have been driven by employee

persuasion. In these cases, employees are motivated by quality of life issues, such as a long commute or child care issues, to request telecommuting arrangements. If the employee is valued by their manager and telecommuting can be reasonably facilitated, the manager may allow the employee to telecommute part-time on an informal basis. Less frequently, compressed work week schedules are implemented in response to an employee's request. Difficult economic conditions have probably slowed the implementation of both telecommuting and compressed work weeks at many companies because employees are less likely to request special accommodations when they are insecure about their position in the company.

Many Santa Clara County employers have on-site services and facilities that reduce the need for employees to have their personal vehicle during the work day, such as cafeterias, fitness centers, and banking and postal services. However, very few of these services were implemented for trip reduction purposes. Most on-site services and facilities exist to provide an employee service and to encourage employees to stay on-site during lunch breaks for productivity reasons.

When economic conditions improve and employee retention and recruitment again become significant issues for Santa Clara County employers, trip reduction strategies that provide quality of life benefits to employees are more likely to be implemented. These include telecommuting, compressed work schedules, and extensive on-site facilities and services.

The large number of employees who work directly with computers in Santa Clara County will shape some aspects of trip reduction programs. Telecommuting is a feasible strategy for a higher percentage of employees in Santa Clara County than in other regions. Since many companies in Santa Clara County manufacture computers, they can provide telecommuting equipment to their employees at low cost. Electronic mail systems provide

a quick and easy way to reach a large number of employees. Transportation coordinators make wide use of electronic mail to provide information to employees and promote commute alternatives. Many Santa Clara County employers have developed sophisticated in-house carpool matching databases that can be accessed directly by employees.

Many trip reduction programs initially focused on education, information, and promotion. As the programs develop the focus shifts to tangible services and incentives, such as a guaranteed ride home and subsidies. Many employers feel that they will have to increase incentives to encourage a significant number of employees to use commute alternatives. However, employers are unsure as to how much and what type of incentives to offer. Even a moderate financial incentive of $1 per day per employee is prohibitively expensive for many employers and the effectiveness of such an incentive is unknown.

The transportation coordinators interviewed face many obstacles in implementing effective trip reduction programs. A common obstacle is lack of management support, which usually translates to insufficient time and money to operate an effective program. However, many coordinators were optimistic that Reg 13-1 would increase support for their programs. Another significant challenge is lack of supporting infrastructure in the county, particularly fast, convenient transit systems and safe bicycle and pedestrian routes. Many transportation coordinators are also pessimistic about their ability to change employees' commute behavior. These coordinators feel that in spite of well developed trip reduction programs, employees will continue to resist using commute alternatives for personal reasons, such as habit, independence, and security. Given these obstacles it is not surprising that most coordinators do not feel they will be able to meet the AVR standards set in Reg 13-1.

Implications

Based on the effectiveness of existing programs, it would appear that employer-

based trip reduction programs are a costly and ineffective solution to air pollution and traffic congestion problems in Santa Clara County. However, a review of existing trip reduction programs in Santa Clara County also reveals abundant opportunities to increase effectiveness and reduce cost. This can be achieved by focusing on the trip reduction strategies that have the most potential to impact employee vehicle use in Santa Clara County at the least cost. While this may seem to be an obvious approach, the fact that many employers currently devote the majority of resources to expensive trip reduction strategies that have limited potential to reduce vehicle trips reveals the difficulty employers have developing effective trip reduction programs.

Over 800 Santa Clara County employers will begin implementing trip reduction programs in 1994 and 1995. The majority of these employers will be small employers, who will have no expertise in the field of employer-based trip reduction and can be expected to have limited resources to devote to a trip reduction program. If these employers mimic existing trip reduction programs, their programs will be ineffective and unnecessarily expensive. However, if these employers focus on the strategies that are most appropriate for their location, work force composition, and company culture they can achieve significant reductions in employee vehicle use at reasonable cost.

CHAPTER 8

EFFECTIVE TRIP REDUCTION STRATEGIES

Research indicates that employer-based trip reduction programs can reduce employee automobile use. However, questions about the overall impact of employer-based trip reduction programs on air pollution and the associated costs still remain. For these reasons it is critical that employers focus on implementing the strategies that have greatest potential to reduce vehicle trips to their site and can be implemented at least cost.

Based on research and employer interviews various trip reduction strategies have been evaluated. The relative effectiveness and cost of these strategies is discussed below as well as the circumstances that determine effectiveness.

Education and Information

Educating employees about the issues surrounding automobile use and providing information about available alternatives is a necessary component of an employer-based trip reduction program. Education and information are particularly important components of new trip reduction programs because employees may be unaware of the issues and options and may be perplexed by their employer's sudden interest in their commute. However, education and information alone do not appear to achieve significant reductions in automobile use. Instead education and information should be viewed as low cost strategies to boost the effectiveness of other trip reduction strategies.

Promotion

The promotion of commute alternatives with fliers, brochures, special events, and prizes can be an effective way to generate employee interest in commute alternatives. However, the challenge is to turn employee interest into a change in commuting practice. Similar to education and information, promotion is a necessary component of a trip reduc-

tion program, but alone will not change employees driving habits. Instead promotion should be used to gain employee interest in commute alternatives and the employer's trip reduction program. The tangible services and incentives offered by the employer can then change employees commuting practices. Promotions should be low cost and appropriate for a particular work place culture.

Carpooling Strategies

Carpooling is by far the most commonly used commute alternative in many urban and most suburban areas. In Santa Clara County solo drivers have indicated that they would be most likely to consider carpooling as an alternative to driving alone. This is true in most areas with limited transit options. In Southern California reductions in vehicle usage have been achieved almost entirely due to carpooling. Strategies to encourage carpooling include ridematching assistance, preferential parking, guaranteed ride home, and incentives.

Ridematching assistance. Ridematching assistance is a critical component of a trip reduction program. Whether a public agency database or an in-house database is used, the service should provide accurate, up-to-date matchlists in a timely manner. At companies where the majority of employees have access to computers a carpool database should be developed that employees can conveniently access from their computers. Most existing carpool databases generate matches based on home location and work hours. There is opportunity to match on additional criteria, such as job position, personal interests and hobbies, and a variety of other preferences. Pictures of potential carpoolers could even be scanned into the database. While this may seem frivolous, it is important to note that one the biggest barriers to carpooling is employee concern that they will get stuck with someone they don't like. This contributes to the fact that most carpools consist of people who already knew each other, such as neighbors and co-workers.

Preferential carpool parking. Employers who have abundant parking often do not believe that preferential carpool parking is necessary. However, designating prime spaces for carpools can reinforce carpoolers behavior and remind solo drivers that other employees are able to make carpooling work for them. Carpool parking spaces should be located close to the building entrances and if possible be shaded or covered to protect cars and occupants from the elements. At some companies managers have demonstrated support for carpooling programs by forfeiting their designated parking spaces for use as preferential carpool parking.

Guaranteed Ride Home. The most frequently listed barrier to the use of commute alternatives is employee concern about transportation in case of emergency or unanticipated over time. This concern is certainly valid for carpoolers, transit riders, and to a lesser extent bicyclists and walkers. Some employers have informal or low-key guaranteed ride home programs because they are concerned about over use. However, this makes the guaranteed ride home program virtually useless as a promotional tool and incentive. Instead employers should be aware that usage of guaranteed ride home programs is usually much less than anticipated and develop the appropriate procedures and controls to avoid over use. The guaranteed ride home program should then be aggressively promoted to potential carpoolers.

Incentives. Since there is little research on the effect of incentives on carpool participation, employers may have to develop carpool incentive programs by trial and error. However, there are some logical starting points. Since continuous financial incentives for all carpoolers can be expensive, employers may want to consider start-up incentives, prizes, and non-financial incentives. A substantial start-up incentive, such as $50 cash or free gasoline, could be offered to employees who try carpooling for a month. After the first month the carpoolers would not receive additional incentives. However, if

carpooling is a viable option for them, the benefits of carpooling, such as financial savings, reduced vehicle wear, and ability to use carpool lanes, should be sufficient to maintain carpool usage. Instead of financial incentives, carpooling incentives could include on-site car washes and oil changes, and automobile club memberships. When selecting carpooling incentives it is important to note that solo drivers in Santa Clara County stated that time is the major factor determining their commute choice. Since carpooling may require more time than solo driving, incentives that save time, such as on-site automobile services, gift certificates for take out dinners, and even time off with pay may be particularly effective. Carpoolers can be entered in prize drawings. The value, odds, and frequency of the prize drawings can be tailored to meet the employer's budget.

Transit Strategies

When a work site is well served by transit an aggressive transit program can be cost effective. This is particularly true if parking is limited and expensive. However, these conditions are usually only met in high-density, urbanized areas. Many employers, who are not well served by transit, spend an unjustifiable amount of time and money encouraging transit use. These employers offer monthly subsidies to transit users and some spend thousands of dollars providing shuttle service to transit stations. It is not uncommon for employers who provide both subsidies and shuttles to spend over $1000 per year for each transit rider without attracting a significant number of new riders.

On-site transit pass sales. Many employers sell transit passes on-site. This service allows regular transit riders to purchase multi-ride transit passes at significantly less cost than daily fares. In some areas, transit agencies and/or private vendors facilitate on-site transit pass sales by providing passes for a variety of transit systems and offering free pick-up and delivery of transit passes.

In the past, transit passes were sold only at major transit stations and employees

who did not regularly travel to these locations either had to make a special trip or pay higher daily fares. However, most transit agencies now offer a variety of options for transit pass purchases. Transit riders can purchase tickets at shopping centers and by mail. Some transit agencies even accept transit pass orders by phone with a major credit card.

Given that most transit riders have other options for purchasing transit passes it may not be necessary for employers to offer on-site transit pass sales. In addition, work sites that are not well served by transit may not have enough transit riders to justify the effort required to establish and maintain an on-site transit pass sales program. In this case, the best strategy is to inform employees about other options for purchasing transit passes.

Subsidies. At work sites where transit service is fast and convenient and parking is limited transit subsidies may not be necessary to encourage transit ridership. Instead information, promotion, and start-up incentives may be just as effective at significantly less cost.

It is important to remember that in areas where transit service is limited the main barrier to transit use is not financial. Few employees can't afford to take transit, but instead shun transit because it is too time consuming and inconvenient. For most employees a $20 per month subsidy is not sufficient to get them out of their cars and onto public transit. Offering subsidies in this environment will result in the majority of subsidies going to employees who already ride transit, with few new riders being attracted.

However, this does not mean that employers with limited transit access should not provide any support for transit users. Employers can offer low cost services and incentives, such as promoting the best transit options, providing information about purchasing multi-use transit passes by mail, and offering trial passes or start-up incentives.

Transit shuttles. In areas where transit service is available it is still not convenient for employees to ride transit unless than can easily get to and from the transit stations. At

work sites that are not directly served by transit, employers may offer shuttle service to make transit a viable option for employees. Since a single contract shuttle can cost $60,000 annually, the cost of providing this service is usually a large portion of the employers' total trip reduction budget. While shuttles may be necessary to attract transit riders, ridership often does not justify this expense.

In special circumstances shuttle service may be cost effective. For example, employers who already operate shuttle service to transport employees between buildings or work sites may be able to add service to transit stations for a small incremental cost. Creative employers have even arranged for their mail vans to transport a few riders to transit stations at no additional cost.

Bicycling Strategies

Nationwide, 2% of employees bicycle to work on a regular basis. Many of these riders are seasonal riders, cycling only during daylight savings time. However, given that nearly 50% of employees live within 5 miles of their work site, there is considerable potential to increase bicycle commuting. Employees who live close to work are unlikely to carpool or ride transit, due to the relatively large in increase in travel time and inconvenience of these modes over short distances. Over distances of less than 5 miles a bicycle is nearly as fast as an automobile and considerably faster than transit. Flat terrain and mild, year around weather facilitate bicycling. Most work sites offer bicycle parking and many have shower facilities. Casual dress codes encourage bicycle commuting because employees do not have to transport and change into business attire. Bicycling meets employees' needs for flexibility, since bicyclists can generally change their arrival and departure times to accommodate work needs. Bicycle commuting also appeals to fitness conscious employees who are too busy to fit regular work-outs into their schedules.

While some areas are well served by bicycle routes the biggest obstacle to signifi-

cantly increasing bicycle commuting is the lack of safe bicycling routes to work sites. However, bicycle advocates and progressive city and regional planners are responsible for recent and planned improvements to the bicycling infrastructure.

Many employers already have some form of bicycle parking, showers, and clothes lockers. However, in many cases these facilities need to be upgraded to facilitate bicycle commuting.

Bicycle Parking. Bicycle racks, which are prevalent at many work sites, do not provide the security or protection from the elements that most bicyclists desire. Bike lockers are effective, but expensive. Less expensive parking options include covered parking pens or inside storage areas, such as under stairwells or in unused storage rooms or offices.

Shower Facilities. Fortunately most work sites already have shower facilities because constructing new showers can cost tens-of-thousands of dollars, an expense that can not be justified solely for the purpose of encouraging bicycle commuting. Many employers currently have clothes lockers available only for day-use and do not allow employees to keep locks on these lockers. Sufficient clothes lockers should be available for each bicyclist to keep a locker on a long term basis, so he/she does not have to transport toiletries, hair dryers, and other supplies to the shower facility each day.

Miscellaneous. Low cost bicycle commuting elements include providing bicycling information and maps, participating in promotional events, hosting on-site bicycle safety and commuting seminars, providing complimentary towel service, and offering start-up incentives. Some employers offer loaner bicycles so employees can try bicycle commuting without having to invest in a bike. If the employee continues to bicycle commute, he/she may purchase the loaner bike at a substantial discount.

While a bicycle commuting program alone will not achieve trip reduction goals,

bicycle commuting can play a role in a trip reduction programs, particularly in areas where weather, terrain, and work place culture are amenable. In areas with limited transit options, bicycle commuting can play a larger role than transit and therefore should receive appropriate resources.

Parking Management

Research studies at work sites throughout the nation have repeatedly found that parking charges and parking supply management are the most effective trip reduction strategy (Pratt 1993, JHK & Associates 1992, U.S. Department of Transportation 1992). However, the barriers to implementing parking charges and parking supply management at work sites include employee resistance, monitoring and enforcement requirements, and city parking policies and requirements.

Parking charges. Most employees view free parking as a right. The Federal government compounds this bias towards free parking. Under the Internal Revenue Code, employer-provided parking is considered a working condition fringe benefit, the value of which is excluded from taxable income. In contrast, financial incentives to carpoolers, bicyclists, or walkers are fully taxable and subsidies to transit riders and vanpoolers are taxable over $60 per month.

One way to reduce employee resistance to parking charges is to dedicate the money generated by charges to providing services and incentives to commute alternative users. In this way, parking charges are not entirely punitive because the feasibility of alternatives is enhanced.

Another strategy is to offer a transportation allowance. In most cases the transportation allowance is set equal to the monthly parking charge. Employees who drive alone to work realize no net gain or loss, but there is a perceived loss since they have to give the transportation allowance back to pay for parking. Employees who carpool

receive free or discounted parking. Transit riders, bicyclists, and walkers pay no parking charge and can use the transportation allowance as they like.

Parking supply management. Reducing the number of available parking spaces can reduce vehicle use provided that there is not additional free parking near the work site. Reducing employee parking supply makes it less convenient for employees to drive to work, particularly if they are faced with having to pay for parking on surrounding streets or in nearby parking garages. However, most cities discourage parking supply management by requiring businesses and developers to provide an excessive amount of parking. Employers and developers will be motivated to operate effective trip reduction programs when they can save money by reducing the number of parking spaces they must build and maintain. After all there is no such thing as free parking. Surface parking consumes valuable land and must be maintained at a cost of nearly $1000 per year, per space and a space in an underground garage costs a minimum of $20,000 to build.

Incentives

Many employers feel they will have to offer incentives to encourage employees to use commute alternatives. They believe that incentives are needed to compensate employees for the time and inconvenience often associated with using commute alternatives. However, it is important to consider that the average automobile driver receives over $2500 per year in subsidies. This certainly dilutes any incentives provided by employers to commute alternative users.

Research indicates that approximately 27% of solo drivers would be motivated to use a commute alternative if their employer offered a cash incentive of $20 per month (Rides for Bay Area Commuters 1993, 26). However, there appears to be a declining return on incentives because only 21% of the remaining solo drivers would be motivated by $60 per month.

The BAAQMD estimates that incentives equivalent to $2 per day will achieve 35% employee use of commute alternatives. However, incentives of $2 per day per commute alternative user can add up quickly. One large Santa Clara County employer calculated that based on the BAAQMD estimate they would need to spend $2.5 million dollars per year on incentives.

It is important that employers carefully analyze the potential effectiveness of incentive programs. Otherwise, they may find that like many transit subsidy programs, a continuous incentive program can require a large amount of financial and staff resources, but attract few new users.

Less expensive alternatives to daily financial incentives, include start-up incentives, point systems, and prize drawings. Start-up incentives, such as a lump sum cash payment or a month's supply of gasoline, may be particularly effective because they can motivate employees to try commute alternatives, thus breaking the solo driving habit. A point system rewards employees for every day they use alternatives, but at less cost than financial subsidies. One Santa Clara County employer holds auctions where commute alternative users use their points to bid for prizes, including bicycles, televisions, and cameras. The perceived value of the point system is enhanced by the fact that the company can purchase the prizes at significant discount. Other employers hold monthly prize drawings for commute alternative users.

Compressed Work Week Schedules

Compressed work weeks can achieve an immediate and significant reduction in employee vehicle use at virtually no cost to the employer. In some cases compressed work weeks can actually save money by reducing office space requirements and utility costs. Compressed work week schedules are usually viewed favorably by employees, but may meet resistance from management particularly in work environments where a large

number of salaried employees typically work long days. However, employers must remember that long work days do not necessarily correlate to productivity. Additional research on the impact of compressed work weeks on employee productivity may be needed to address employer resistance.

Telecommuting

Because the cost of providing telecommuting equipment to an employee for home use is high, telecommuting is most cost effective when employees already have home computer equipment or the employer can provide the equipment at low cost due to a special circumstance, such as self-manufacture or a down sizing that results in surplus equipment. Many businesses, who would benefit from widespread acceptance of telecommuting including telephone, computer, and telecommunications companies, are aggressively promoting telecommuting as a trip reduction strategy. However, the cost of telecommuting is difficult to justify based only on trip reduction potential. Other benefits to the employer including increased productivity, improved recruitment and retention, and reduced office space requirements may justify telecommuting programs.

Part-Time Use

One strategy that is gaining acceptance is the promotion of part-time use of commute alternatives. Research indicates that many employees do not consider commute alternatives because they either can't or don't want to use an alternative 5 days per week (Commuter Transportation Services 1993, 2). This is particularly true of potential carpoolers who assume that other employees would want to carpool on a full-time basis. However, in reality many carpoolers do not carpool 5 days per week.

Transportation coordinators can design promotions and incentive programs that encourage part-time commute alternative use. For example, a "don't drive one in five" campaign encourages employees to try an alternative just one day per week. Since part-

time use requires less commitment and life style change, employees are more likely to try a commute alternative. Many employees who initially use a commute alternative 1-2 days per week will realize sufficient benefits to increase use to 3-4 days per week. Employers can encourage part-time use by designing incentive and award programs that do no require full-time use. For example, an incentive program should not exclude employees who carpool only 1-2 days per week. Instead, these employees would receive a proportionally lower incentive.

Personal Vehicle Use

Employees need for their vehicles to perform personal errands before, during, and after the work day is a significant obstacle to the use of commute alternatives. Employers can reduce employee vehicle use by providing on-site services and facilities. For example, on-site cafeterias, fitness facilities, and banking and postal services can enable employees to dine, exercise, and perform personal errands without leaving the work site. However, since some on-site services and facilities can be time consuming and expensive to offer, it is important for employers to carefully analyze the trips employees make during the day, so effective strategies can be developed.

If the majority of lunchtime trips are to dining establishments, the employer may be able to significantly reduce these trips by increasing on-site dining options. However, if the majority of trips are to a wide variety of service establishments, such as banks, dry cleaners, beauty salons, car washes, and drug stores, an employer may not be able to provide these services on-site. Instead, the transportation coordinator can encourage employees to perform all their personal errands on one or two days, leaving the other days available for using a commute alternative. Similarly, the transportation coordinator can encourage employees to carpool and alternate driving responsibility, so they will have their personal vehicle available a couple days each week. It is also possible to significantly

reduce lunchtime trips by offering employees the option of a 30 minute lunch break instead of a full hour. Many employees leave the work site during 1 hour lunch breaks only because they would be bored staying on-site. Most employees would gladly accept a 30 minute lunch break in exchange for the option to arrive to work 30 minutes later or depart 30 minutes earlier.

Alternative Methods

Regulators have shown a willingness to allow employers to adopt alternative strategies to employer-based trip reduction. If an employer can find more cost effective ways to reduce emissions and congestion than employer-based trip reduction, they can propose these strategies to the regulating agencies. In Southern California, ARCO petroleum company purchased and retired old automobiles that were previously in use, achieving a significant reduction in emissions because old automobiles emit nearly 10 times as much pollution as newer vehicles. Other employers have converted company vehicles to clean fuels. The BAAQMD has shown a willingness to consider any alternative strategy that can achieve air emission reductions equivalent to a successful trip reduction program. Employers, who have difficulty achieving trip reduction standards due to special circumstances, may find that alternative strategies are less expensive than an employer-based trip reduction program.

Summary

The most effective trip reduction program meets the unique needs of the employees and the employer. Effective employer-based strategies will vary with location, work force composition, company culture, and numerous other site specific factors. Although there are some trip reduction strategies that are effective at most work places, the most effective trip reduction program will be one that is customized for a specific work environment. It is important that employers who are beginning trip reduction programs not mimic

the existing programs of other employers. It will be well worth the effort for employers to thoroughly evaluate employee needs, work site characteristics, and the transportation environment of the community. With this information they can identify trip reduction strategies that will be most effective at their work site. These strategies can then be prioritized based on cost effectiveness.

Research has repeatedly shown that some strategies are cost effective for most work sites. These include ridematching, guaranteed ride home, preferential parking, and parking charges. Unless the work site is very unique, these strategies provide a good starting point. Others strategies, such as continuous incentives and transit subsidies and shuttles, are often unjustifiably expensive and should be avoided unless special circumstances exist.

Employers should keep an open mind about some strategies that don't initially appeal to them or appear difficult implement, such as parking charges and compressed work week schedules. The effectiveness of these strategies can far outweigh the associated difficulties.

CHAPTER 9

SUPPORTING EMPLOYER-BASED TRIP REDUCTION EFFORTS

To date, employer-based trip reduction programs have been developed largely by trial and error and implemented without complementary strategies, supporting infrastructure, or appropriate guidance and assistance. This has greatly limited the effectiveness and efficiency of employer-based trip reduction programs. Since many employers will begin trip reduction programs in the near future to comply with regulatory requirements, it is critical that this situation be remedied so these employers do not face the same unnecessary obstacles their predecessors have worked against.

Non-employer Trip Reduction

Employers should not be solely responsible for trip reduction programs. Trip reduction programs should be required at retail centers, schools, activity centers, and other establishments that generate a significant number of vehicle trips. Not only will employer-based trip reduction efforts be complemented by efforts at other facilities, but trips to non-work destinations, which comprise nearly 80% of vehicle trips, will be reduced.

Other Transportation Control Measures

Employer-based trip reduction programs have the potential to play an important role in reducing automobile pollution and traffic congestion. However, employer-based programs alone can not address the air quality and traffic congestion problems that plague most cities. Instead, employer-based trip reduction should be viewed as just one component in a comprehensive approach that includes market-based measures, urban planning practices, new technologies, and other appropriate regulations.

It important to remember that employer-based trip reduction was selected as a starting point not because these programs were viewed as the most effective means of

curbing automobile use, but primarily because regulators had the authority to require these programs. The CAP submitted by the BAAQMD contains 23 Transportation Control Measures (TCMs). However, TCM #2: Employer-based Trip Reduction is the only TCM that is close to being widely implemented. Other TCMs that can support employer-based trip reduction programs must be aggressively pursued.

Develop Alternatives

It is important that reasonable alternatives to the single occupant vehicle be developed as quickly as possible. Currently, the majority of transportation planning is focused on long term projects, such as major rail expansions. Unfortunately, the majority of these projects will not be completed before the year 2000, too late to help employers meet trip reduction goals. Measures that can be implemented quickly, such as carpool lanes, bus service expansions, and improved bicycle access should be given high priority. Since it is unlikely that funding is available for these projects, market-based measures, such as gas taxes, vehicle registration fees, and parking charges, may need to be implemented to generate revenue.

Legislation

Legal barriers to the implementation of effective trip reduction programs include potential employer liability associated with work at home options, employer-sponsored shuttles, and even employer carpooling assistance. It is important that liability issues be investigated and employers provided with guidance on minimizing liability risks. Legislation may be required to protect employers from unavoidable and excessive liability associated with trip reduction programs.

Currently, California labor code discourages compressed work weeks by requiring employee votes and overtime pay. Since compressed work weeks are viewed positively by most employees this protection may not be necessary for many types of employees.

The labor code should be modified so employers do not have to provide additional compensation to employees who choose to work compressed work week schedules.

Current federal and to a lesser extent state tax code discourages incentives to commute alternative users, while encouraging free parking at the work site. Tax code changes are required that will encourage employers to subsidize commute alternatives instead of single occupant vehicle use. Incentives to carpoolers, bicyclists, and walkers should be given non-taxable benefit status and free parking should be considered a taxable benefit.

City Policies

City ordinances that favor automobile use over other modes of transportation should be reviewed. Zoning ordinances that require single-use development and excessive parking should be revised to promote acceptable mixed-use development, paid parking, and transit, bicycling, and pedestrian facilities.

Cities can even play a role in reducing employer resistance to parking charges. Since many employers will not implement parking charges for fear of employee backlash, cities may need to take the lead by implementing paid parking and permit systems on city streets and at city facilities. In this way the cities will begin to change individuals' expectations about free parking. Cities will also have to play a role in addressing parking spill over by implementing paid parking or permit systems and supplying adequate enforcement on streets surrounding work sites.

Research

There is still tremendous need for high quality research on employer-based trip reduction. The Federal Highway Administration and the Transportation Research Board are primary sources of research on a National level. Commuter Transportation Services, a public, non-profit ridesharing agency, actively researches trip reduction programs in

Southern California. RIDES is the primary source of research on Bay Area commute issues. Research efforts need to expand on all levels with particular focus on evaluating the cost effectiveness of various strategies in diverse environments.

Since many employers feel they will have to offer incentives to achieve significant reductions in employee vehicle use, research is needed to determine what type of incentives will be most effective. This is particularly important given that incentive programs can quickly become costly for employers.

Employer concerns about telecommuting and compressed work weeks can be addressed by researching the productivity of employees in these work arrangements.

It is also necessary to gain better understanding about overcoming behavioral barriers to the use of commute alternatives. Research is needed to determine the role of behavior in commuting choices and how employees' perceptions and attitudes can be changed to favor commute alternatives. This requires the involvement of behavioral scientists, who have not typically been involved in researching transportation issues. However, RIDES and other public ridesharing agencies have begun to sponsor research studies on this topic.

It is important that research results be easily accessible to transportation coordinators. Although research on employer-based trip reduction has increased dramatically in the past few years, many transportation coordinators are unaware of research findings. This is because research is performed by numerous public agencies and often published in obscure journals in a variety of fields including transportation, urban planning, and even psychology.

Guidance and Assistance

It is particularly important that high quality support services be available to employers in the near future because many employers will begin implementing programs in

1994 in response to regulatory requirements. If these employers do not have access to information and support, they are likely to mimic existing programs and make many of the same expensive mistakes.

Employers need guidance from organizations and individuals who have extensive experience with trip reduction programs and keep abreast of research findings in the field. Currently, public agencies provide the majority of assistance to employers. Public ridesharing agencies, such as RIDES, offer training sessions, networking groups, reference materials, ridematching services, and short-term consulting services. In general, the quality of these services is good and the price is certainly right with most services offered free or at minimal cost. However, because trip reduction is a new field and public agencies often do not pay sufficient wages to attract highly qualified people, some of the individuals providing assistance to employers are new to the field and have little experience with employer trip reduction programs. In addition, most public agencies do not have adequate staff resources to provide extensive, on-going assistance to employers. In spite of these limitations, ridesharing agencies can be a valuable resource for employers.

Regulatory agencies, such as the BAAQMD, also provide some guidance to employers. However, regulatory agencies primarily answer questions specific to the regulation and provide only limited guidance on developing and implementing an effective trip reduction program. Because of staff limitations most regulatory agencies do not attempt to provide personalized assistance to employers.

Due to the limitations on service provided by public agencies, it is likely that private businesses will play a major role in providing trip reduction assistance to employers. This is certainly true in Southern California where existing transportation consulting firms have developed extensive trip reduction services and entrepreneurs have developed a variety of new products and services to meet the needs of employers.

Summary

In the near future, employer-based trip reduction programs will become widespread. Programs will become more aggressive and sophisticated than many current programs. However, if employers must continue to work against significant obstacles and develop programs by trial and error, employer-based trip reduction programs will have minimum effect on vehicle use and be unjustifiably expensive.

If the major obstacles to the implementation of effective trip reduction programs are minimized and appropriate support is available to employers, employer-based trip reduction programs can play an important role in reducing traffic congestion and air pollution. With appropriate support employers who already have trip reduction programs can make their programs more effective and less costly and employers who are just beginning trip reduction programs can avoid costly and time consuming mistakes.

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APPENDIX A

SANTA CLARA COUNTY EMPLOYEE SURVEY RESPONSES

Table 4. Commute Alternative Choice

Survey Question: If you drive alone now, which of the following commute alternatives would you consider using?		
Mode	Number	% of respondents
Ridesharing	4777	77.3 %
Carpool	3508	56.7 %
Vanpool	1269	20.5 %
Transit	3694	59.8 %
Bus	1295	20.9 %
Light Rail	1191	19.3 %
CalTrain	773	12.5 %
BART	435	7.0 %
Non-motorized	1525	24.7 %
Bicycle	1182	19.1 %
Walk	343	5.5 %
Total	6182	greater than 100.0 % due to multiple responses

Source: Golden Triangle Commuter Network Survey, 1991.

Table 5. Incentives to Encourage Commute Alternatives

Survey Question: Which of the following incentives would encourage you to use an alternative to driving alone?		
Incentive	Number	% of respondents
Guaranteed Ride Home	5000	56.2
Flexible Work Hours	4039	45.4
Subsidy for using alternative	2678	30.1
Ridematching Assistance	2426	27.3
Transit Subsidy	1770	19.9
On-Site Transit Pass Sales	1629	18.3
Awards and Prizes	1590	17.9
Preferential Carpool Parking	1420	16.0
Transit Trip Assistance	1143	12.8
Other	314	3.5
Total	8889	greater than 100% due to multiple responses

Source: Golden Triangle Commuter Network Survey, 1991.

Table 6. Obstacles to Commute Alternative Use

Survey Question: What is preventing you from sharing a ride or using transit to get to work?		
Obstacle	Number	% of respondents
My work schedule	7855	40.7
Do not like to depend on others	7637	39.6
Can not get home in an emergency	7505	38.9
Need my car for personal business	7328	38.0
Prefer to drive alone	6439	33.4
Transit service does not meet my needs	5386	27.9
Need my car for work	4114	21.3
Difficult to find ridesharing partner	3988	20.7
Ridesharing adds to much time	3663	19.0
Difficult to get from train station to work	2595	13.4
Do not know if transit is available	1568	8.1
Other	4647	24.1
Total # Respondents	19303	total greater than 100% due to multiple responses

Source: Golden Triangle Commuter Network Survey, 1991.

Table 7. Business Use of Vehicle

Survey Question: If you drive to work, how often do you use your vehicle for meetings or activities related to business during the work day?		
Frequency	Number	% of respondents
Every Day	92	4.8
Frequently (3-4 days)	81	4.2
Occasionally (1-2 days)	229	11.8
Rarely (1 day)	641	33.2
Never	888	46.0
Totals	1931	100.0

Source: Golden Triangle Commuter Network Survey, 1991.

Table 8. Personal Use of Vehicle

Survey Question: If you drive to work, how often do you use your vehicle for business, lunch, or personal business?		
Frequency	Number	% of respondents
Every Day	5154	21.9
Frequently (3-4 days)	5626	23.9
Occasionally (1-2 days)	6092	25.9
Rarely (1 day)	4117	17.5
Never	2564	10.9
Totals	23553	100.1

Source: Golden Triangle Commuter Network Survey, 1991.

Table 9. Part-time Commute Alternative Use

Survey Question: If you drive alone now, would you consier ridesharing to work on a occasional basis, for example one or two days per week?		
Response	Number	% of respondents
Yes	7583	39.8 %
No	7093	37.2 %
Don't know	4376	23.0 %
Totals	19052	100.0 %

Source: Golden Triangle Commuter Network Survey, 1991

APPENDIX B

SANTA CLARA COUNTY EMPLOYER INTERVIEWS

EMPLOYER INTERVIEW CONTACTS

Contact Title	Company/Location	No. of Santa Clara County Employees
Kathleen Frizzi Bay Area Transportation Coordinator	Hewlett-Packard Corporation Palo Alto	16500
Susan Shara Transportation Manager	Lockheed Missiles & Space Systems Sunnyvale	15000
Tom Jorgensen Transportation Manager	IBM Corporation San Jose	8000
Alan Aranha Environmental Programs	SUN Microsystems Mountain View	7000
Angela Rae TSM Coordinator	Apple Computers Cupertino	6500
Linda Griffin Employee Transportation Coordinator	Intel Corporation Santa Clara	6000
Cindi Anden Transportation Coordinator	Varian Corporation Palo Alto	4000
Nick Yatsko Transportation Manager	Tandem Computers Cupertino	3500
Craig Van Kessel Transportation Coordinator	Applied Materials Santa Clara	2500
Lucy Street Transportation Manager	FMC San Jose, Santa Clara	2200
Rose Siller Employee Services	Rolm Systems Santa Clara	2000
Gloriana Garma Transportation Coordinator	Watkins-Johnson Corporation Palo Alto, San Jose	1350

EMPLOYER INTERVIEW CONTACTS (Continued)

Contact Title	Company/Location	No. of Santa Clara County Employees
Georgina Lehne Employee Services	GTE Mountain View	1200
Jodi Sherman Commute Coordinator	City of Sunnyvale Sunnyvale	1200
Maxine Doss Employee Services	Acuson Mountain View	1000
Margaret Nalbach Employee Services	Alza Corporation Palo Alto, Mountain View	700
Candi Strong-Lapides Site Services	Aspect Telecommunications San Jose	270

INTERVIEW QUESTIONNAIRE

Date _____

Time _____

Company _____ City _____

Contact name _____ Phone _____

1. Which of the following best describes your worksite?
   _____ headquarters _____ single location firm
   _____ branch office _____ other

2. How many sites does your company have in Santa Clara County? _____

3. How many employees work at your site?

   _____ full time _____ part time _____ contract

4. What job positions do the majority of your employees hold

   _____ managerial _____ technical _____ manufacturing

   _____ administrative _____ other

5. How would you describe the majority of employees' work schedules?

   _____ fixed _____ flexible _____ irregular

6. How long has your company had an active commute program? _____

7. How many hours per week of staff time are devoted to the program? _____

8. What is the total annual budget for your program? _____

9. What is the AVR for your site? _____

10. Has the commute program affected your AVR? _____

11. Has your company experienced any transportation related problems such as parking shortages, customer access, recruitment, or new site construction?

    _____

INTERVIEW QUESTIONNAIRE (Continued)

12. What are the benefits of the commute program to your company?

_____

13. Which of the following program elements are currently available or being considered for the future?

	have	cost	considering
information center	_____	_____	_____
carpool matching service	_____	_____	_____
preferential parking	_____	_____	_____
vanpool subsidies	_____	_____	_____
transit pass sales	_____	_____	_____
transit subsidy	_____	_____	_____
shuttles to transit	_____	_____	_____
bicycle racks/lockers	_____	_____	_____
shower facilities	_____	_____	_____
guaranteed ride home	_____	_____	_____
on-going incentives	_____	_____	_____
awards/prize drawings	_____	_____	_____
commute recognition	_____	_____	_____
clubs	_____	_____	_____
events			
_____	_____	_____	_____
_____	_____	_____	_____
_____	_____	_____	_____
employee communications			
_____	_____	_____	_____
_____	_____	_____	_____
_____	_____	_____	_____
compressed work week	_____	_____	_____
flexible schedules	_____	_____	_____
telecommuting	_____	_____	_____
on-site cafeteria	_____	_____	_____
banking/ATM	_____	_____	_____
other on-site services			
_____	_____	_____	_____
_____	_____	_____	_____
_____	_____	_____	_____
_____	_____	_____	_____
misc.			
_____	_____	_____	_____
_____	_____	_____	_____
_____	_____	_____	_____

INTERVIEW QUESTIONNAIRE (Continued)

14. Which components have been most effective?

_____	_____
_____	_____
_____	_____

15. How do you monitor program and component effectiveness?

_____

16. What obstacles do you face in implementing a successful commute program?

_____ lack of employee interest	_____ insufficient staff time
_____ lack of management support	_____ knowledge of what works
_____ insufficient financial resources	_____ other _____

17. How have economic conditions at your company impacted the commute program?

_____

18. What is the parking situation at your site? _____ cost _____ supply

19. What impact will Regulation XIII have on your program?

_____

_____

20. Will your site be able to meet the AVR standards specified in Regulation XIII?

_____

_____

21. What are the main priorities for the commute program over the next 1-2 years?

_____

_____

22. How is your program changing as it matures?

_____

Table 10. Staff Hours Devoted to Trip Reduction Program

Company	# Santa Clara County Employees	Annual Staff Hours	Annual Staff Hours per Employee
Hewlett Packard	16500	6000 + limited contract shuttle staff	0.36 + limited shuttle staff
Lockheed	15000	8000 + 18000 for extensive shuttles	0.53 + 1.2 for shuttle
IBM	8000	2000	0.25
Sun Microsystems	7000	500 + extensive shuttles, previously 2000 reduced in 1992	0.07 + contract shuttle staff
Apple Computer	6000	4000 previously 7000 reduced in 1993	0.66
Intel	4000	2000	0.50
Varian	4000	1250	0.31
Tandem	3500	2000 expected to decrease	0.57
Applied Materials	2500	1500	0.60
FMC	2200	1000	0.45
Rolm	2000	2000	1.00
Watkins Johnson	1350	2000	1.48
GTE	1200	100	0.08
City of Sunnyvale	1200	1000	0.83
Acuson	1000	300	0.30
Alza	700	50	0.07
Aspect Telecom	270	50	0.18
Average	4495	2176 does not include shuttle staff	0.48 does not include shuttle staff

Table 11. Financial Expenditure on Trip Reduction Program

Company	Annual Expenditure	Annual $ per Employee	Most Expensive Components	Effect of Economy
Hewlett Packard	confidential	-	transit subsidy staff	less with more for a long time, but can get resources with justification
Lockheed	+ $1,000,000 includes extensive shuttles	$67	shuttles staff	long term downsizing, creates chaos atmosphere, carpools broken-up
IBM	no official $ for commute program, but have shuttles	-	shuttles staff	major impact
Sun Microsystems	confidential +$100,000 includes extensive shuttles	-	shuttles	extensive impact, benefit that gets cut, staff time significantly reduced
Apple Computer	confidential	-	subsidy program	-
Intel	confidential	-		no internal impact, but external resources cut, ie. transit
Varian	$120,000 + staff	$30 + staff	transit subsidy	low key program
Tandem	$65,000 + staff +$20,000 bike lockers	$19 + staff + bike lockers	shuttle transit subsidy events	staff time and budget will probably be cut, spend more time justifying expenses

Table 11. Continued

Company	Annual Expenditure	Annual $ per Employee	Most Expensive Components	Effect of Economy
Applied Materials	$35,000 + staff + $250,000 shuttles	$14 + staff + $100 shuttles	shuttles transit subsidy marketing	no impact
FMC	$180,000 inclusive	$82 inclusive	shuttles transit subsidy staff	budget less, lost staff person, layoffs broke up carpools and vanpools
Rolm	$10,000 + staff	$5 + staff	-	no impact, no cost associated with most elements
Watkins-Johnson	confidential	-	-	layoffs broke up carpools
GTE	no official $	-	-	lack of staff time, employees more willing to carpool to save money
City of Sunnyvale	$50,000 but not spent	-	-	-
Acuson	no official $	-	-	-
Alza	$42,000	$60	transit subsidy carpool subsidy	increased employee participation
Aspect Telecom	no official $	-	-	new program, hope budget will reflect company's success

Table 12. Information and Promotion

Company	Information Center	Promotional Events	Communication Methods
Hewlett Packard	X	X Beat the Back-up, Bike to Work Day, Spare the Air, Transportation Fairs	e-mail, newsletters, bulletin boards
Lockheed	X	X Beat the Back-up, Try Transit Week, Spare the Air, Commuter Fairs, Commuter Coffees	posters, e-mail, newsletters, new hire orientation
IBM	X	Commuter Fair	bulletin boards, newsletter, e-mail
Sun Microsystems	X	Spare the Air, Beat the Back-up, Bike to Work Day	e-mail
Apple Computer	X	Bike to Work Day, Beat the Back-up	direct mail, e-mail, bulletin boards
Intel	X internal	Commuter Fair, Beat the Back-up, Bike to Work Day, Spare the Air	fliers, e-mail, signs, directed mailings, newsletter
Varian	X	Commuter Fair, Beat the Back-up, Pool Parties	targeted mailings, newsletters, e-mail, posters
Tandem	X	Bike to Work Day, Beat the Back-up, Spare the Air	e-mail, newsletter, posters
Applied Materials	X	Commuter Fairs, Spare the Air	fliers, e-mail, newsletters

Table 12. Continued

Company	Information Center	Promotional Events	Communication Methods
FMC	X	Beat the Backup, carpool and vanpool meetings	e-mail, voicemail, newsletters, direct mailing
Rolm	X	Commuter Fairs, brown bag meetings, Spare the Air	bulletin boards, e-mail
Watkins Johnson	X	Autumn Fest	bulletin boards, newsletters
GTE	X	Environmental Fairs, Health Fairs	e-mail, mail, bulletin boards
City of Sunnyvale	X	Earth Day, Wellness Fair, Beat the Back-up, Spare the Air	newsletter, paycheck notice, bulletin boards, e-mail
Acuson	X	Beat the Back-up, Spare the Air	bulletin boards, newsletter, new hire packet,
Alza	X RIDES	Beat the Back-up, Transit Fair	newsletter
Aspect Telecom	X	Commuter Fair, Spare the Air	voicemail, fliers, bulletin boards

Table 14. Transit Strategies

Company	On-site Transit Pass Sales	Transit Subsidy	Shuttles to Transit
Hewlett Packard	X	X $20/month	Cupertino site
Lockheed	X	prize drawings	X
IBM			X
Sun Microsystems		X $20/month	X
Apple Computer		X $20/month	X
Intel	X	X $20/month	X
Varian	X	X $20/month	
Tandem	X	X $20/month	X
Applied Materials	X	X $20/month	X
FMC	X	X $20/month	X
Rolm	X	X	
Watkins Johnson	X	X	
GTE			X
City of Sunnyvale	X		
Acuson			X
Alza	X	X up to $60/month	X
Aspect Telecom			

Table 13. Carpool Strategies

Company	Carpool Matching Service	Preferential Carpool Parking	Incentives to Carpoolers
Hewlett Packard	X RIDES	X	
Lockheed	X nternal	X	on-going prize drawings
IBM	X developing internal, self serve	considering	
Sun Microsystems	X internal, self serve		
Apple Computer	X internal, self serve	X	$1 per day
Intel	X internal	X	
Varian	X	X	
Tandem	X		
Applied Materials	X	X	points redeemed for prizes
FMC	X	X	
Rolm	X		
Watkins Johnson	X	X	
GTE	X		
City of Sunnyvale	X		
Acuson	X		
Alza	X RIDES		$ 1 per day
Aspect Telecom	X	X	

Table 15. Bicycling Strategies

Company	Bicycle Parking	Shower Facilities	Misc.
Hewlett Packard	X racks and lockers	X	bicycle e-mail network, maintenance supplies, Bike to Work Day event
Lockheed	X	X	
IBM	X	X	
Sun Microsystems	X racks and secure shelter	X	Bike to Work Day event
Apple Computer	X racks and lockers	X	$1 per day, bicycle fleet, Bike to Work Day event
Intel	X	X	
Varian	X	X	
Tandem	X racks and lockers	X	Bike to Work Day event, Bicycle Commuter Club
Applied Materials	X	X	points redeemed for prizes
FMC	X	X	
Rolm	X	X	
Watkins Johnson	X	X	
GTE	X	X	
City of Sunnyvale	X	X	
Acuson	X informally allow bicycles inside	X	
Alza	X	X	$ 1 per day
Aspect Telcom	X	X	

Table 16. Miscellaneous Strategies

Company	Guaranteed Ride Home	On-going Incentives	Awards and Prize Drawings	Commuter Recognition	Miscellaneous.
Hewlett Packard	X currently formalizing		X	X	focus groups to access commuter needs, electric vehicle outlets
Lockheed	X		X		extensive shuttle program
IBM	X				developing on-line transit information
Sun Microsystems					heavy marketing focus with parking lot signs, mobiles, and brochures, extensive shuttle program
Apple Computer	X	X $1 per day	X	X	
Intel	X			X	new hire orientation video
Varian	X informal		X		
Tandem	X		X		bike fleet
Applied Materials	X	points redeemed at auction	X		extensive shuttle program
FMC	X informal		X	X	
Rolm			X		on-line commute information

Table 16. Continued

Company	Guaranteed Ride Home	On-going Incentives	Awards and Prize Drawings	Commuter Recognition	Miscellaneous.
Watkins Johnson	X				subsidized vanpools for relocated employees
GTE	X		X	X	
City of Sunnyvale					
Acuson					
Alza		X $ 1 per day			
Aspect Telecom				X	working with other small employers in business park on joint projects

Table 17. Work Schedules

Company	Work Force Composition	Work Schedules	Compressed Work Weeks	Telecommuting
Hewlett Packard	technical, marketing. managerial	flexible	few	limited and informal
Lockheed	technical	70% flex 30% fixed	yes	no
IBM	technical, manufacturing	flexible	yes	informal
Sun Microsystems	technical	flexible	yes	yes
Apple Computer	1/3 technical, 1/3 managerial, 1/3 administrative	flexible	no	yes
Intel	don't know	fixed and flexible	yes	informal
Varian	manufacturing	fixed	no	no
Tandem	65% technical, 20% administrative, 15% managerial	flexible	no	yes
Applied Materials	technical. manufacturing	fixed	no	no
FMC	40% manufacturing, 30% technical 25% managerial 5% administrative	80% fixed	yes	no
Rolm	technical, managerial, manufacturing	flexible	no	informal
Watkins-Johnson	manufacturing	flexible	no	some
GTE	50% technical, 25% managerial 25% administrative	fixed	no	no

Table 17. Continued

Company	Work Force Composition	Work Schedules	Compressed Work Weeks	Telecommuting
City of Sunnyvale	public works, safety	fixed	yes	no
Acuson	50% manufacturing, 25% technical, 25% administrative	fixed and flexible	no	no
Alza	technical, manufacturing, administrative	flexible	yes	no
Aspect Telecom	technical, customer support	flexible	informal	yes

Table 18. On-Site Services and Facilities

Company	Cafeteria	Fitness	Banking	Other
Hewlett Packard	X	X	X	photo developing, event ticket sales, postal service
Lockheed	X	X	X	company store, travel agency, photo developing, dry cleaning
IBM	X	X	X	photo developing
Sun Microsystems	X	X	X	postal service
Apple Computer	X	X at cost	X	daycare at cost, photo developing
Intel	X	X	X	sundry store, dry cleaning, photo developing, classes, postal service
Varian	X		X	dry cleaning, photo developing
Tandem	X	X	X	education center, company store, postal service, photo developing
Applied Materials	X	X	X	
FMC	X		X	
Rolm	X	X	X	photo developing
Watkins Johnson	X			postal
GTE	X		X	employee sales, photo developing, auto services, garden plots, sports
City of Sunnyvale				
Acuson	X	X		
Alza	X	X		exercise class
Aspect Telecom	X	X	X	postal

Table 19. Trip Reduction Program Effectiveness

Company	Average Vehicle Ridership (AVR)	Trend	Program Monitoring Mechanisms	Able to Meet AVR Standards	Effect of Reg 13-1
Hewlett Packard	1.13 estimate	don't know	surveys, transit pass sales, bike network	no	little impact
Lockheed	1.19 survey	no increase in 12 years, but not declining	survey, shuttle riders follow up calls	no unless mandated parking charges	not much change
IBM	1.1 estimate	don't know	shuttle usage, GRH	don't know will try	more serious program
Sun Microsystem	1.15 survey	don't know	survey	no	increase program credibility, mandated minimum performance
Apple Computer	not available	not available	$1 per day incentive program	no	none more time required for tracking and surveying
Intel	1.17 survey 1992	slight increase from 1.15 in 1991	survey	yes, initially, but not by 1995 or 1996	not much, more effort into survey and preparing plans
Varian	1.21 survey 1991	don't know	lot counts, incentive program, transit pass sales	ok for awhile, probably not final goal of 1.35	more adminstrative requirements, loosen up management resistance
Tandem	1.15 survey 1992	don't know	annual survey, activity participation, shuttle riders, transit pass sales, phone calls	will be able to achieve 1.2, but not 1.35 until light rail expands	positive, increase managment support and commitment

Table 19. Continued

Company	Average Vehicle Ridership (AVR)	Trend	Program Monitoring Mechanisms	Able to Meet AVR Standards	Effect of Reg 13-1
Applied Materials	1.2 estimate	don't know	survey incentive program	hopefully	primary goal to meet AVR
FMC	1.16 1992 survey	decrease	survey	no	not much, already doing it
Rolm	don't know	don't know	survey	yes	don't know
Watkins Johnson	don't know 20% participate	no effect	parking stickers, vanpool subsidy, transit subsidy	don't know	no impact
GTE	don't know	don't know	survey	yes	don't know
City of Sunnyvale	1.12 survey	don't know	survey	try	will need to implement programs that cost money
Acuson	don't know	don't know	survey	no idea	will be forced to have program and spend money on it
Alza	don't know	don't know	incentive program	yes at least for 1st year	don't know, increase employee participation
Aspect Telecom	don't know	don't know	survey	don't know	none, will already have program
Average	1.16 includes only employers with survey results	-	-	-	-

Table 20. Program Motivation

Company	Number Years of Program	Transporation Issues	Parking	Reason for Program
Hewlett Packard	15	some sites with parking shortages	free and abundant, but not necessarily close to buildings	community and corporate policy, began in response to energy crisis, regulations now a factor
Lockheed	20	none, work a lot with cities on transportaion issues	free and abundant	employee service in response to energy crisis, continued due to employee demand
IBM	2 shuttles only	none	free and abundant	leadership and community, now regulation
Sun Microsystem	3.5	new site	free and abundant	compliance with local ordinnaces
Apple Computer	2.5	not currently, in past	free and abundant	to get R&D center built, now regulations
Intel	3	major parking shortage, lots of mitigation involved with new site	free, extreme shortage	new site, compliance with ordinances and regulation, good citizen
Varian	25	started program in response to parking problem, but ok now	free and 20% empty	community citizen
Tandem	1.5	none, except too much parking	free and abundant	develop new properties, regulations, community vision
Applied Materials	2	some parking shortages	free, some buildings with shortages	environmental and employee program

Table 20. Continued

Company	Number Years of Program	Transporation Issues	Parking	Reason for Program
FMC	8	none	free and abundant	community and employee program
Rolm	4	none	free and abundant	previously employee benefit, now regulations
Watkins-Joh	2	none	free, availability varies	internal advocate
GTE	10	none	free and abundant	environmental and community program
City of Sunnyvale	3	none	free, availability varies	set example for other employers
Acuson	3	none	free and abundant	ordinances and regulations
Alza	8	site construction	free and abundant	corporate culture, good citizen
Aspect	1 month	none	free and abundant	environmental and employee program, regulation

Table 21. Obstacles to Implementing Program

Company	Internal	External	Employee Behavior
Hewlett Packard		negative press coverage	no percieved problem
Lockheed		lack of transit	reluctant to change
IBM	economic conditions		
Sun Microsystems	management changes	company's bad experience with Reg 15	
Apple Computer		city requirements don't make sense, unrealistic	
Intel	work place culture	lack of transit and bicycling	independence
Varian	slow to change, resist innovative strategies		
Tandem	daytime travel to meetings, irregular and long work hours	inadequate bike lanes	child care issues
Applied Materials			
FMC		lack of transit, lack of external promotion	security and committment
Rolm	internal approval is time consuming		
Watkins Johnson	management support and money		
GTE	lack of staff time		
City of Sunnyvale	short distance commutes, on-call workforce, employees need vehicles		
Acuson	lack of staff time		
Alza			convincing employees
Aspect Telecom			changing habits

Table 22. Priorities

Company	Most Effective Strategies	Most Resources Currently Devoted	How Program Changing	Priorities for Future
Hewlett Packard	education	transit subsidy, staff	move from education to rewards, targeted information, regional program	carpool distribution list, consistency between sites, focus groups, meet AVR goals, bike program, carpool parking
Lockheed	information and promotion, personal assistance	shuttle, staff time	more awarness, more expansive, broader thinking	other alternatives to reduce air polllution, such as clean air vehciles
IBM	GRH	shuttles	not applicable new program	on-line ridematching and information, commuter recognition
Sun Microsystems	shuttles, promotions, transit subsidy	shuttles, transit subsidy	focus on compliance and gaining management support	low key due to difficult economic conditions, focus on regulation
Apple Computer	carpool programs, bike programs	transit subsidy, fleet bike program	mode specific marketing	shift from mass marketing to mode specific
Intel	carpooling supported by pref parking, guaranteed ride home, on-site facilities and parking shortage	transit pass subsidy	fix problems, focus on carpooling and rail transit, maybe incentives	focus on things that work instead of adding new elements

Table 22. Continued

Company	Most Effective Strategies	Most Resources Currently Devoted	How Program Changing	Priorities for Future
Varian	on-site transit pass sales and subsidy, personal assistance	transit pass subsidy	formal guaranteed ride home program, subsidies to carpools, bicycle program	less fru-fru, more serious, quality of life and environmental issues
Tandem	carpool program and ridematching, bicycle program	shuttle, transit pass subsidies, bike lockers	developing bicycle and carpool programs	more difficult to get employees attention, reach plateau
Applied Materials	incentive program, guaranteed ride home, transit subsidy, shuttles	shuttles, transit subsidy	more marketing, brochures, more professional, more accessible	more customer oriented
FMC	carpooling, ridematching, carpool parking, shuttles	shuttles, transit subsidy, staff	get more people involved, reduce parking, more forceful	not changing, stable
Rolm	communicate with employees	not available	meet AVR	more focus
Watkins Johnson	vanpools, transit subsidy	vanpools, transit subsidy	gain funding, carpool subsidies	-
GTE	information center, ongoing promotion	no cost	keep promoting, more active, meet AVR	not changing

Table 22. Continued

Company	Most Effective Strategies	Most Resources Currently Devoted	How Program Changing	Priorities for Future
City of Sunnyvale	personalized assistance	no cost	guaranteed ride home, bicycle programs, new hire package, transit subsidy	more employee awareness
Acuson	matchlists, shuttle	-	viable program, gain management support	new program
Alza	$1 per day subsidy	transit subsidy	increasing participation, compliance	$1 per day subsidy for all modes
Aspect	encouraging employees, promoting part-time use	-	shuttle, transit subsidy	new program