SELECTED COMMUNITY IMPACT ANALYSES OF THE PROPOSED RAPID TRANSIT PROGRAM

report to

SOUTHERN CALIFORNIA RAPID TRANSIT DISTRICT

Arthur D. Little, Inc.
SAN FRANCISCO

1974

Arthur D. Little, Inc. ONE MARITIME PLAZA · SAN FRANCISCO CALIFORNIA 94111 · (415) 981-2500

May 21, 1974

Mr. George MacDonald
Manager, Planning and Marketing
Southern California Rapid Transit District
1060 S. Broadway
Los Angeles, CA 90015

Dear Mr. MacDonald:

In accordance with our contract dated March 11, 1974, and our subsequent discussions and correspondence, including our letter of March 21, we are pleased to submit this initial report entitled "Selected Community Impact Analyses of the Proposed Rapid Transit Program." These impact statements cover:

1. Individual mobility and access to opportunities;
2. Development policy and the rapid transit program;
3. Impacts on travel convenience, travel times, and travel opportunities;
4. Community access to opportunities;
5. Impacts on travel congestion and ease of automobile travel;
6. Impact on private automobile cost; and
7. Impact on regional growth.

They have been completed by our staff in a period of eight weeks.

Chapter IV of our report answers the questions which you raised in your letter of April 29 relative to the utility of cost-benefit analysis as a criterion for supporting your go/no go decision on the entire project. You will note that we believe the economic state-of-the-art has grown

beyond the conventional cost-benefit analysis approach to decision making. For this and other reasons we recommend that a series of specific cost-effectiveness studies be completed which will allow you to choose alternative transportation modes throughout your proposed corridors of service. This will, in effect, allow you to synthesize all of the prior planning and test service assumptions against the goals of the district and the objectives of the proposed transportation improvement program.

As noted in Chapter V of the report, we recommend that the Impact on Access to Opportunities and the Impact on Private Automobile Subsidies sections be expanded to develop additional voter information to be used in your public relations program.

We have appreciated this opportunity to work with you, your staff, and your consultants, and look forward to assisting you further over the next several weeks.

Sincerely,

Cyril C. Herrmann

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Vice President

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TABLE OF CONTENTS

		Page
	List of Tables and Figures	iii
I.	INTRODUCTION AND SUMMARY	1
II.	INDIVIDUAL MOBILITY AND ACCESS TO OPPORTUNITIES	6
	A. MOBILITY FOR THOSE WITHOUT CARS	6
	B. ENHANCED MOBILITY FOR THE CAR OWNER	7
III.	SELECTED IMPACTS	10
	A. DEVELOPMENT POLICY AND THE RAPID TRANSIT PROGRAM	10
	B. IMPACTS ON TRAVEL CONVENIENCE, TRAVEL TIMES, AND TRAVEL OPPORTUNITIES	15
	C. ACCESS TO OPPORTUNITIES – SOUTH CENTRAL AND VAN NUYS	29
	D. IMPACTS ON TRAFFIC CONGESTION AND EASE OF AUTOMOBILE TRAVEL	40
	E. IMPACT ON PRIVATE AUTOMOBILE COST	48
	F. IMPACT OF THE PROPOSED RAPID TRANSIT SYSTEM ON GROWTH AND DISTRIBUTION OF GROWTH WITHIN LOS ANGELES COUNTY AND THE REGION	60
IV.	AN ANALYSIS OF COST-BENEFIT AS A CRITERION FOR ASSESSING THE INVESTMENT IN RAPID TRANSIT	68
	A. INTRODUCTION	68
	B. THE COST-BENEFIT ANALYSIS FRAMEWORK	68
V.	RECOMMENDED FURTHER ACTIONS	80

LIST OF TABLES AND FIGURES

Table No.		Page
1	Comparison of Travel Times Between Transit in 1990 and Existing Bus System for Selected Trips	23
2	Comparative Travel Times, Automobile Versus Transit – 1990	26
3	Ranking of Job Categories for Los Angeles County, the Central District, and the Central Business District	30
4	Projected Jobs by Occupation Types, 1970-1975, for Los Angeles County	33
5	Major Occupation Group of Longest Job Since Leaving School for Those on Full-time Schedules	34
6	Persons Not in the Labor Force Who Want, Might Want, or Would Want a Regular Job Now, and Reason Not Seeking Work: All Races	35
7	Employment by Occupation Type, Los Angeles Business District – 1970	36
8	Mode of Transportation to Work – South Central Los Angeles and Van Nuys	38
9	Usual Place of Work for Residents of South Central Los Angeles	38
10	Number of Miles Driven Annually: Households with Cars in Los Angeles County – 1973	49
11	Number of Miles Driven Annually by Family Characteristics: Los Angeles County Households – 1973	50
12	Estimated Cost of Operating a Compact Size 1972 Model Automobile	52
13	Passenger Car Operating Cost Summary for Baltimore Versus Los Angeles (Adjusted)	53
14	Case 1 – Potential Annual Savings Assuming No Commute Parking Cost at Present	54
15	Case 2 – Potential Annual Savings Assuming $2 Daily Commute Parking	55

LIST OF TABLES AND FIGURES (Continued)

Table No.		Page
16	Typical Annual Costs for Operating a Compact Size Automobile in Los Angeles County During 1974	57
17	Comparison of Population Forecasts for the SCAG Region	62
18	Anticipated Growth of Selected Subareas of Los Angeles County – 1970-1990	64
19	Comparison of Employment Forecasts for the SCAG Region	64
20	Anticipated Employment Growth of Selected Subareas of Los Angeles County	65

Figure No.		
1	Travel Times Between Downtown Los Angeles and Different Parts of the County, Existing SCRTD Bus System	16
2	Travel Times Between Downtown Los Angeles and Different Parts of the County, All-Bus Alternative	17
3	Travel Times Between Downtown Los Angeles and Different Parts of the County, Proposed Balanced Transportation System	18
4	Travel Times Between Lakewood and Different Parts of the County, Existing SCRTD Bus System	19
5	Travel Times Between Lakewood and Different Parts of the County, All-Bus Alternative	20
6	Travel Times Between Lakewood and Different Parts of the County, Proposed Balanced Transportation System	21
7	Vehicle Operating Costs Versus Mileage – Under Various Parking Assumptions	58
8	Schedule for Proposed Work	84

I. INTRODUCTION AND SUMMARY

On March 11, 1974, the Southern California Rapid Transit District (SCRTD) engaged Arthur D. Little, Inc., (ADL) to make a community impact study of a proposed rapid transit program. The assignment was to develop a series of position papers which would be essentially non-evaluative: not to attempt an assignment of dollar values to specific impacts which were essentially non-economic, but rather to identify key impacts on transportation users and to quantify or describe these impacts in meaningful terms for the average citizen.

Six separate impact statements presented in Chapter III cover the areas of development policy; travel time, convenience, and opportunity; access to work opportunities; traffic congestion and ease of auto travel; private automobile operating costs; and economic activity. It is expected that these statements will be used as a basis for the SCRTD Public Information Program which will address the concept of rapid transit for Los Angeles and the effect of the specific rapid transit proposals. The Public Information Program will focus on critical transit-related issues: individual mobility of residents and access to opportunity, viability of the Los Angeles economy, balance in transportation facilities, quality of the regional environment (e.g., air quality, community identity, activity centers, and livability), and the Los Angeles life-style.

The specific impacts described in this report are based on the program described in the March 26, 1974 report, "A Public Transportation Improvement Program." Service level assumptions, route alignment, and modal mix described in that report, which is essentially a summary of the Phase III consultant findings, comprise the assumptions behind our impact statements. Much of the current data used was obtained from the recent SCAG reports and some of the data are based on primary research conducted by ADL during the past eight weeks.

Among the significant findings and conclusions of our work are the following:

Automobile-related

- The average automobile driver in Los Angeles who switched to public transit for his daily work commute would save, on a conservative estimate basis, $1,100 per year.

- Those drivers who commute 30-40 miles per day (round trip) could save more than $1,500 per year.

- A one-car family could save up to $1,900 per year by choosing mass rapid transit instead of buying a second car.

- Parking in downtown Los Angeles has risen to a cost of between $2.75 and $4 per eight-hour day.

- In terms of family expenditures and income, the average Los Angeles household is spending approximately twice as much per year on automobiles as on clothing.

- The average cost of highway construction built since 1938 is $3.3 million per linear mile. The most expensive link in the 485-mile Los Angeles freeway system is the proposed Beverly Hills Freeway which would cost $80 million per mile. The estimated cost of a fixed guide rail rapid transit system for Los Angeles is $30 million per mile.

- The average annual operating cost for automobiles in Los Angeles County is $1,400.

Development-related

- The so-called "centers" policy which has been adopted by both the City and County of Los Angeles and by the Southern California Association of Governments (SCAG) is to a large extent supported by the planned SCRTD program. The program appears to provide the catalyst for the revitalization of older centers, the high capacity for people movement into and out of the centers, and the accessibility deemed appropriate in the SCAG report for the specialized centers.

- The proposed rapid transit system is likely to encourage clustering of multi-family and medium- to high-density residential development around station locations.

- By increasing higher-density residential development in the central Los Angeles area, the system would increase the number of residents living within a reasonable distance of employment opportunities which are found in the central area.

- One of the greatest potential contributions of the rapid transit program to land use and development policy would be the acceleration of recycling of older, unstable urban areas in and near the regional core and near older urban centers such as Pasadena, Long Beach, Compton, Santa Monica, and El Monte.

- In station locations where the greatest patronage is expected there would be significant incentives for investment in new residential, commercial, and office development.

- The rapid transit system should serve to reduce the pressure for new development in the fringe areas, and promote the SCAG plan to preserve open space.

Related to Travel Convenience

- The most significant benefits of the transit program would accrue to those who, by choice or necessity, now use the existing transit system. The most dramatic effects of the transit system would be the reduced travel times by public transit.

- For many potential travelers, a rapid transit system would offer substantial cost and time savings over travel by automobile.

- The automobile will continue to be the primary source of mobility in Los Angeles. But for some, the availability of rapid transit would preclude the need for a second or a third car.

- For many, the rapid transit system will offer the ability to go more distant places in the same amount of time – rather than reduce travel time – by bringing within the same time-distance greater opportunities for work, shopping, recreation, and entertainment.

- The effect of the rapid transit system will be similar to the past effects of the freeway system in Los Angeles: it will increase accessibility within the area. For those who prefer to live closer to their place of work and near activity centers, the system will make it possible to get there faster and more conveniently.

Related to Access to Opportunity and Commuting

- Various employment impacts would result from mass rapid transit in Los Angeles. Some communities would have improved access to job opportunities; others, because of lack of job skills compatible with job opportunities, would benefit only by direct employment with SCRTD at facilities located in the community.

- Twenty-two percent of the South Central community now uses public transportation for job-related commuting. Two percent of the Van Nuys community relies on public transit.

- The majority (52%) of the work trips generated by residents in the South Central area are made within that area.

- Seventeen percent of the households in Los Angeles County have no automobile; 31% have one automobile. Contrary to general impressions, auto availability in Los Angeles is not much higher than in other metropolitan areas and is lower than in several.

Related to Area Growth in Los Angeles County

- With improved access to the CBD provided by the proposed transit system, finance, insurance, real estate, and related professional and business service sectors of the economy probably will continue to concentrate in the major centers of activity. Thus, a growth rate higher than the anticipated rate of 5% in the CBD is likely.

- Increased retail activity is likely to occur in the CBD resulting from both place of employment in these areas and the improved access for shoppers that will be provided by the transit system.

- In terms of residential location and redistribution, it is anticipated that conversion to higher densities will occur near the corridors of the transit system, resulting in population growth in these areas in excess of that anticipated by the first round of population forecasts. This growth may be at the expense of residential development in outlying areas.

- From a regional standpoint, the development of a rapid transit system will not reduce the overall trip activity as measured in passenger-miles. The proposed line-haul transit system will improve access between centers of development, and therefore a dramatic increase in movement between and among centers will probably dictate that no decreases will occur in overall regional trips.

Related to Traffic Congestion and Ease of Automobile Travel

- The proposed rapid transit system with both fixed guide and feeder systems can directly affect the sources of congestion in Los Angeles: first, by making it possible to move to, within, and out of high activity centers by a mode which requires far less space than the automobile for the volume of travel desired to be served; and second, by providing an alternative, more space-saving means of movement among non-core areas which reduces the amount of traffic that must pass through core areas to specific destinations.

- To the extent that people choose to travel by mass rapid transit in a highly traveled corridor or to an activity center, congestion on the freeways and on the street can be reduced out of proportion to the number of persons diverted to transit.

- Rapid transit has a potential capacity to carry 40,000 people per hour from one place to another on the equivalent of less than one lane on the freeway; to achieve the same capacity for auto travel would require almost 20 lanes of freeway.

- The greatest effects of rapid transit on reducing traffic congestion will occur where rapid transit is provided on separate rights-of-way from automobile traffic.

- By 1990, the number of daily person-trips made in the region is expected to increase by 18 million to 45 million (an increase of 65%) while the population will increase by 2.7 million, according to the latest forecasts. Although a greater proportion of total traffic will occur outside of Los Angeles County in the more rapidly developing areas, the population of the urbanized areas of Los Angeles County will account for an increase of 5 million daily trips (a 30% increase over today's level). Many of those trips will have destinations requiring passage through the regional core, due to the structure of the freeway system and of the region.

- The primary impacts of the diversion of trips from automobile to mass rapid transit will be felt on the freeways connecting large residential areas and major employment centers and within the high activity centers of southern Los Angeles County, especially downtown Los Angeles, the Wilshire corridor, Commerce, and Long Beach central business districts – areas which are currently the most congested in the region and which are served by the most congested freeways.

- The reduction of traffic on the now crowded freeways will probably cause a substantial diversion of traffic from arterial streets parallel to the freeway, easing local traffic congestion, and improving local circulation.

- The rapid transit system will have two major effects: it will provide an alternative mode of transportation to the automobile, and it will increase the total capacity of the transportation system to handle the increased travel demands from the existing population and new growth in the area.

II. INDIVIDUAL MOBILITY AND ACCESS TO OPPORTUNITIES

The primary purpose of any transportation system and every transportation system improvement is to increase the ability of people to find and keep jobs, visit with friends and relatives, buy daily necessities, attend cultural events, enjoy recreational facilities, go to school, and do those many other things which make up the daily life of most people. Los Angeles offers, more than most metropolitan areas, a fantastic variety of opportunities and environments for work and play, shopping, and entertainment. These opportunities are spread over a vast geographic area and many by their nature require the low densities and large spaces which typify the Los Angeles area. Even for low-income residents, there are communities where a family can have a house with a backyard and trees and space for children. Often, however, possession of these amenities brings with it isolation from other resources, services, and contacts.

A. MOBILITY FOR THOSE WITHOUT CARS

Due to the dominance of automobiles as a mode of travel, it is often assumed that virtually everyone in Los Angeles either has an automobile or has access to one. This is an illusion. Data in the 1970 Census show that while automobile availability in Los Angeles County is more widespread than in several older eastern cities, such as Boston and Philadelphia, it is by no means the highest in the country (Detroit and Minneapolis-St. Paul have higher ratings in this respect) and is in fact not much different from automobile availability in the San Francisco-Oakland area. Seventeen percent of households in Los Angeles County do not own an automobile and 31% have only one. With a population of just over 7 million, this means that about 1.2 million people are completely dependent on public transit.

Who are those who do not have automobiles or access to them? The poor, the young, the elderly, the handicapped, and others who choose for various reasons not to drive. Many who have low incomes, or even moderate incomes, do not have automobiles for the obvious reason of cost. Automobile ownership is very expensive and is becoming more expensive as the price of gasoline, of repairs, of insurance, of parking, and of new cars themselves skyrockets. Those who have the lowest incomes – the unemployed – are thereby unable to obtain what is one of the most important means of gaining employment – access to knowledge about job opportunities, access to places of work to investigate job opportunities, and access to the job itself. In a large metropolitan area like Los Angeles, employment opportunities are widely distributed. Seeking jobs itself becomes a monumental, time-consuming task without a car. Since job mobility tends to be high for the re-employed, and since available housing is limited in many areas, the opportunity to move closer to the job is not always a realistic alternative. Househunting itself usually requires an automobile.

But it is not only the poor or the unemployed who depend on public transit. There are the young who are legally unable to drive. In addition, older teenagers cannot usually afford to purchase a car. Except in families with three or four cars, parents must chauffeur them

around or they are dependent on public transit to get beyond their immediate neighborhoods, to stores, museums, athletic events, beaches, parks, playgrounds, and movies. In addition, most parents do not want to spend a substantial amount of their time simply driving their children around.

Many, if not most, elderly people do not drive either for reasons of income, physical disability, fear, or preference. The elderly are generally restricted substantially in their mobility in any event and the absence of access to automobiles confines them to an even greater extent to one small neighborhood and denies them access to various opportunities for using their vast amounts of leisure time. They too are dependent on a public transit system. Although time is perhaps less important to them than to employed persons, convenience and safety are critical.

The everyday effect on those without access to an automobile is seen in the fact that households without automobiles simply make fewer trips. These households must ration their travel severely and depend primarily on the neighborhood for social contacts, shopping, recreation, and entertainment. A study of the Bay Area, for instance, indicated that in households where two cars were available, daily trips per household were three times those made in households where no car was available and 50% higher than those made in households where only one car was available. Where three cars were available, trips per household were almost four times as high as where no car was available.

This effective restriction on mobility has a particularly disastrous effect on the financial status of the low-income family and the elderly on Social Security. Forced to restrict their buying to places within walking distance, except for the rare trip to a major center, they generally must pay more for goods and services because of the higher prices in small neighborhood stores which have captive consumers. As various studies have shown, prices for food and other necessities have almost always been higher in neighborhood stores primarily serving low-income clientele. Most of their clients do not have the ability to shop comparatively or to take advantage of the lower prices offered in larger department and chain stores.

Public transportation is the only feasible means to provide for the needs of the least mobile, and costs must be relatively low. But it is not feasible to provide only for the transit needs of the poor. To the extent that the majority of the population relies solely on automobiles for travel, it will be more difficult financially and less justifiable to provide frequent, convenient, and effective public transit systems because overall patronage will be too low. Fortunately, even in Los Angeles there are opportunities for increasing mobility through improved public transit for others, and thereby serve the needs of both groups.

B. ENHANCED MOBILITY FOR THE CAR OWNER

Although automobile owners and users tend to have excellent mobility in Los Angeles today, it is becoming more restricted in the central areas and the future promises even greater constraints on movements by automobile and the convenience of using cars for certain kinds

of trips. Most noticeable today is the substantial congestion which occurs in downtown Los Angeles, at the airport, along Wilshire Boulevard, and in other major centers of the county, including various shopping centers, caused by the attempt by many people in many cars to get into the same space at the same time.

Despite the existence of the greatest freeway system in the world, capable of carrying cars at 70 mph for large distances, residents are forced to move along during rush hours at speeds ranging from 5-20 mph. It is doubtful that even the most far-ranging expansion of the freeway and street system can eliminate congestion in the most intense activity centers. Further, there is increasing evidence that residents of Los Angeles are unwilling to accept the high costs in disruption, displacement, removal of homes and businesses, and increases in air pollution and noise which massive new freeway building and accommodation of more vehicular traffic in the regional core would entail.

In addition, it is not clear that mobility of residents to and among high activity centers would be substantially improved by additional freeways. Analysis of traffic moving into and out of downtown indicates clearly that surface streets within downtown Los Angeles severely restrict the access of workers and shoppers into the central area, no matter how much capacity the freeways can handle. While the freeways are very good at handling traffic moving away from centers, the centers themselves cannot absorb the traffic funneled into them. In addition, it often takes substantial amounts of time to find a parking place, store the car, and arrive at a destination from the parking area.

As Los Angeles' major centers continue to grow, even though the rate of growth will not be very high, the difficulties of access to these centers and within them will increase. As a result of increased congestion, both automobile and surface bus travel will become more time-consuming. Employment in downtown Los Angeles is expected to grow by 14,000-17,000 by 1990. If current trends continue this means that an additional 10,000-12,000 cars will be attempting to enter the CBD during the morning rush hours. As congestion increases, businesses will find it less and less desirable to locate in these centers, contrary to the expressed planning policy of both the city and county and of the Southern California Association of Governments. As a result there will be increasing pressure to expand the commercial areas outward from the existing centers into the residential areas, in order to obtain cheaper land for parking required and in order to obtain better access and less congestion for employees, clients, servicemen, and delivery trucks.

Rapid transit will have substantial benefits for existing automobiles users in two ways. First, those who will be well served by transit and will find it more convenient to use due to actual time-savings, cost-savings, freedom from the need to drive, and lack of need for an additional automobile will have available a choice. Second, those who must continue to drive or choose to continue to drive for a variety of personal or work-related reasons will have less competition for road space and parking space.

Perhaps the most distinctive characteristic of Los Angeles is the high mobility of its population, compared to other areas. Probably nowhere else in the world has such a high degree of mobility been achieved, with access for most residents to an enormous area offering a

tremendous variety of goods and services, employment opportunities, recreational opportunities, beaches, parks, museums, restaurants, art galleries – all attuned to a population with increasing leisure time. This high degree of mobility is built upon the availability of the automobile and roads to serve it. Clearly, Los Angeles' freeway and road system is a wonder; what is lacking is a balance in available transportation facilities, the component to make up for what the automobile cannot provide: ability to move large numbers of people to high-activity centers, rapidly, safely, and pleasantly. This component needs to be added to the existing transportation system to increase overall mobility and to improve on what exists, rather than to displace the need for the existing system.

Examination of information on time spent by Los Angeles residents traveling to work shows that residents are unwilling to devote any more time to that journey than in other areas and generally have to spend less time. Most workers try to live within a 30-minute commuting distance from their work and are able to do so, even though the distance in miles may be as high as 20. However, this is increasingly becoming difficult. If one desires to live farther from major employment centers, it is necessary to spend increasing amounts of time going to and from work. Rapid transit would expand the total range of choices by reducing the amount of time required to reach these centers from a large variety of residential areas.

III. SELECTED IMPACTS

A. DEVELOPMENT POLICY AND THE RAPID TRANSIT PROGRAM

The City of Los Angeles, the County of Los Angeles, and the Southern California Association of Governments (SCAG) have each adopted land use and development policies which are particularly relevant to the proposed rapid transit system and to the effectuation of which rapid transit can contribute.

1. The 'Centers' Policy

The city, the county, and SCAG have, as a key to local and regional land use policy, placed emphasis on the channeling of future growth and the replacement of obsolete and deteriorated facilities in a system of "centers" in the region, and particularly in southern Los Angeles. The city's long-range "Concept Los Angeles" identifies 57 centers of varying importance in the city and surrounding areas which are proposed to become the location of a substantial proportion of employment, public facilities, major attractions, and high-density housing. The county's newly amended "General Plan" and "Environmental Development Guide" contain the same policy and identify a hierarchy of centers, ranging from the dominant center of downtown Los Angeles to widely dispersed smaller centers throughout the county.

Intimately tied to the "centers" policy are policies aimed at preserving the low-density residential "suburbs" of Los Angeles and the desire to minimize unnecessary urban expansion into existing and badly needed open spaces at the fringes of the urbanized area. SCAG's policies support both the centers concept and the related policies which it implies.

The city's plan explicitly recognizes the need for a rapid transit system to effect policy implementation of the centers concept. Rapid transit is essential to this concept in two ways: it can make the continued viability of existing employment and commercial centers possible by reducing congestion and increasing accessibility to and within these centers from the lower-density residential areas; it can provide the necessary catalyst for rejuvenation and revitalization of older centers in the regional core and surrounding areas by increasing the desirability of living, working, and doing business in these areas. At the same time, the rapid transit system can enhance the viability of continued low-density settlement in the older residential areas of Los Angeles, which are threatened by increasing pressure for multi-family development, by increasing the attractiveness of the centers for higher-density residential development, and improving the desirability of the older single-family areas for families.

The centers would be foci for surrounding residential communities, with commercial development of varying intensity as one moved out from the core; and in some cases, particularly in the regional core, they would be locations for specialized regional economic activities and attractions which can only be supported by a very large population with access to

them. In order to provide a high degree of accessibility to these specialized centers, such as downtown Los Angeles, the Miracle Mile, the Civic Center, and other areas, the rapid transit system must have a high capacity for movement of people into and out of the centers and a means for accommodating the heavy travel movements required within the centers.

The proposed rapid transit system would interconnect 26 of the 57 centers identified in the city's "concept" plan, and three of the five primary centers and five of the eight secondary centers indicated in the county plan. The interconnection of these centers would, in accordance with explicit city policy, make possible improved economic linkages among industries and businesses and improved access to these centers from areas of high residential density. In addition, the bus feeder systems which connect to rapid transit stations in these centers will provide increased access to the centers themselves from surrounding residential communities, as well as improved transit circulation within the larger centers.

Particular emphasis in both the city and county plans is given to the need for a recycling of land into new and higher-intensity uses in the regional core, including downtown Los Angeles and the intensively developed areas to the west. In the proposed mass rapid transit system, access to and within the regional core, extending approximately from La Brea and Wilshire east to the Los Angeles central business district, is emphasized, making this area the multinucleated focus of the transit system and providing the greatest capacity for travel within, into, and through this corridor. This area, plus the southerly portion of the central area, including Exposition Park and nearby areas, is most in need of relief from congestion and of transportation improvements which can support private reinvestment and redevelopment. Experience has shown in other cities which have built rapid transit lines and systems that rapid transit can significantly enhance the incentives to reinvestment in such areas by offering increased accessibility to employment, commercial centers, and high-density residential complexes.

In addition, the proposed rapid transit system is likely to encourage clustering of multifamily and medium-to-high residential development around station locations outside the regional core; this will simultaneously enhance potential for such development in these areas and relieve the pressure for more continuous medium-density development within large areas of single-family, low-density development which currently exist. In contrast, the tendency of the freeway and an all-bus system is to encourage a more dispersed pattern of medium- and higher-density housing within predominantly low-density areas, increasing the pressure for conversion of low densities to higher densities and constituting an invasion of the single-family suburban areas.

2. Employment Opportunities and Commercial Services at Convenient Locations

Increasingly, most employment opportunities in Los Angeles County are in those sectors which are involved in services, trade, finance, and similar sectors which require both high accessibility to each other and high accessibility to residents. Thus, the presence of employment and commercial services in the same locations is becoming increasingly common, in

contrast to the former separation resulting from a strong differentiation between the dominance of industry as a source of employment opportunities and the population-serving function of commercial services.

The policy of the City of Los Angeles is to concentrate offices, retail services, and entertainment facilities, which will provide both employment and services, in centers, and gradually to eliminate strip commercial development of a former era.

This policy is intended to increase the convenience of access to services and employment for residents and to enhance the attractiveness of Los Angeles for business. In addition, the city and the county wish to ensure that the significant industrial base of the city is maintained and expanded, which requires that they be served by convenient transportation. Since increasing congestion threatens the viability of both commercial and industrial areas, rapid transit is seen as a key to continued economic health as well as to the accessibility of residents to available jobs. Los Angeles County presently has a well-dispersed set of major industrial areas which are located near major residential areas. The rapid transit system can serve both these industrial areas and the residential areas and improve access to industrial employment for those most dependent on transit, as well as those who simply live far from the location of job opportunities.

One of SCAG's major objectives is to achieve an improved balance between jobs and residences in subareas of the region in order to reduce the length of work trips. However, achievement of this objective will probably be limited by the availability of appropriate land for industry and commerce as compared to the location of land suitable for new or higher-density residential development. To the extent that the mass rapid transit system makes higher-density residential development attractive in the central Los Angeles area and in and near centers, it will increase the number of residents who live within a reasonable distance of employment opportunities which are found in the central area due to existing and past development patterns and the presence of critical requirements for industry and commerce.

It is unlikely, however, that significant reductions can be achieved in the average length of work trips (in miles) due to the fact that Los Angeles residents, as is true of residents in most metropolitan areas, have a high degree of both job mobility and residential mobility. If mobility is to be maintained in the labor market, it is unlikely that the region can achieve substantial shifts in residence-work relationships because of the normal mismatch between the frequency of employment changes and residence changes. Changes in employment for most members of the labor force are not normally correlated with changes in residential locations because of the different factors affecting each. A household normally changes its place of residence during its lifetime as a result of changes in family composition and income, changes such as the birth of a child, an increase in job status within the same firm, and ultimately the departure of children from the family. On the other hand, changes in employment may either occur much more frequently or much less frequently in cycles which have little if anything in common with the timing involved in changes in family composition or income.

If both of these different cycles are to operate fairly smoothly, the primary worker in the household must be able to change one of these critical factors without necessarily changing the other. Improvement in overall travel mobility in the Los Angeles area has allowed this to occur in the past and will almost certainly be necessary in the future if workers are to have substantial opportunities for economic advancement and attainment of desired housing choices. Thus, home-to-work trips are likely to be at least as long, on the average, as they are today, and potentially longer for many heads of household. On the other hand, many individuals or childless workers may choose to reduce the length of their work trip as increased amounts of suitable housing are available near major employment centers.

The rapid transit program can enhance both of these possibilities by increasing the potential length of work trips without increasing travel times, and by enhancing the possibilities for new residential development near employment opportunities in the major centers.

The proposed rapid transit system will have its major effect on increasing accessibility within the central Los Angeles area, an area which is already the most intensely developed part of the region for both residence and employment, and containing 60% of the region's population. Thus, in effect, it is unlikely to have much of an impact on expansion of the region outward, tending rather to encourage increased location of jobs and population within the already developed area. This effect will be somewhat different from the effect of BART in the San Francisco Bay Area or Metro in Washington, D.C., where the systems tend to reach out to the more undeveloped areas of their regions, encouraging further outward expansion. As a result there should be little encouragement of more distant job-residence relationships.

3. Recycling Older Urban Areas

One of the most critical concerns of the city, the county, and SCAG is to make use of already urbanized areas in the central Los Angeles area and in some other parts of Los Angeles County to provide for new growth in housing, services, commerce, and industry. This is necessary in order to take advantage of existing public infrastructure, to maintain the viability of existing commercial facilities, and to diminish unnecessary urban expansion in the region which would reduce open space and recreational opportunities accessible to the population, and require new facilities and services.

One of the greatest potential contributions of the rapid transit program to land use and development policy will be to accelerate the possibilities for recycling of older, unstable urban areas in and near the regional core and near older urban centers, such as Pasadena, Long Beach, Compton, Santa Monica, and El Monte. In station locations where the greatest patronage is expected there will be significant new incentives for investment in new residential, commercial, and office development which would, in all likelihood, be unobtainable without major public subsidies comparable to those involved in urban renewal projects. The greatest impact will

occur, of course, in the regional core due to its already established dominance as a center of regional activity and the increase in accessibility to it compared to other areas. Since the rapid transit system has a proportionately greater effect on reducing travel times to the core as one moves farther from the core, it will tend to recapture some of its declining dominance as a center of commercial activity. In turn, the presence of new employment, commercial, and public services will generate new demand for residential development, tempering the tendency toward constant expansion outward into new, undeveloped areas.

4. Preservation of Open Space and Recreation Areas from Urbanization

By encouraging recycling of older, underdeveloped central areas of Los Angeles County, by enhancing the continued viability of centers as major locations of economic activity and residence, and by increasing accessibility and reducing congestion within the already urbanized areas of the region, the rapid transit system should serve to reduce the pressure for new development in the fringe areas which the city, county, and SCAG wish to preserve for open space. Although the outer stations of the rapid transit system, with parking lots to permit auto access, will tend to expand the acceptable range of commuting beyond current limits, in almost all cases that range is expanded into areas which are already urbanized and the centers which are enhanced by the system are already centers of the region.

By encouraging new development and redevelopment in the urbanized portions of the region, the pressure for urban expansion into new areas will be reduced, although it is difficult to estimate to what extent. What seems very sure is that, to the degree that future growth is not provided for within areas susceptible to reinvestment and recycling, there will be increased pressure for new development outside the boundaries of current development.

B. IMPACTS ON TRAVEL CONVENIENCE, TRAVEL TIMES, AND TRAVEL OPPORTUNITIES

The most significant impacts of the rapid transit program in Los Angeles will, of course, be on opportunities for travel in the area. Different groups will be benefited differently by the program:

- Users of the present bus system,
- Residents who are not presently served by transit,
- Drivers who would prefer to use transit for certain trips, particularly travel to work, but cannot afford the extra time presently required to go by bus,
- Drivers who have to use their automobiles, even for travel to work, because they need a car for their work, and
- Residents who always prefer to drive for various personal reasons.

1. Benefits to Transit Users

By far the most significant benefits of the transit program will accrue to those who now use, by choice or necessity, the existing transit system. They will benefit from reduced travel times, expanded coverage, and more frequent service.

a. Impacts on Travel Times

At present, bus riders can expect to spend from two to four times as long making a trip by bus as by automobile. Figures 1 through 3 show comparative travel times for the existing SCRTD bus system, the all-bus alternative, and the proposed balanced transportation system between downtown Los Angeles and different parts of the county during the rush hours. Figures 4 through 6 show travel times from Lakewood to other areas for the same alternatives.

The most dramatic effect of the transit system will be to reduce travel times by transit from residential areas to high activity employment centers. This is seen most graphically in the comparison of current travel times by bus with future travel times by the balanced transportation system to the Los Angeles central business district (CBD). Many trips will require less than one-half and some less than one-third the amount of time now required to go by public transit. Those who live the farthest from their destinations will benefit the most. For example, a trip from Terminal Island to downtown Los Angeles now takes more than two hours by bus. With the proposed system, the trip would take a little less than an hour.

FIGURE 1 TRAVEL TIMES BETWEEN DOWNTOWN LOS ANGELES AND DIFFERENT PARTS OF THE COUNTY, EXISTING SCRTD BUS SYSTEM

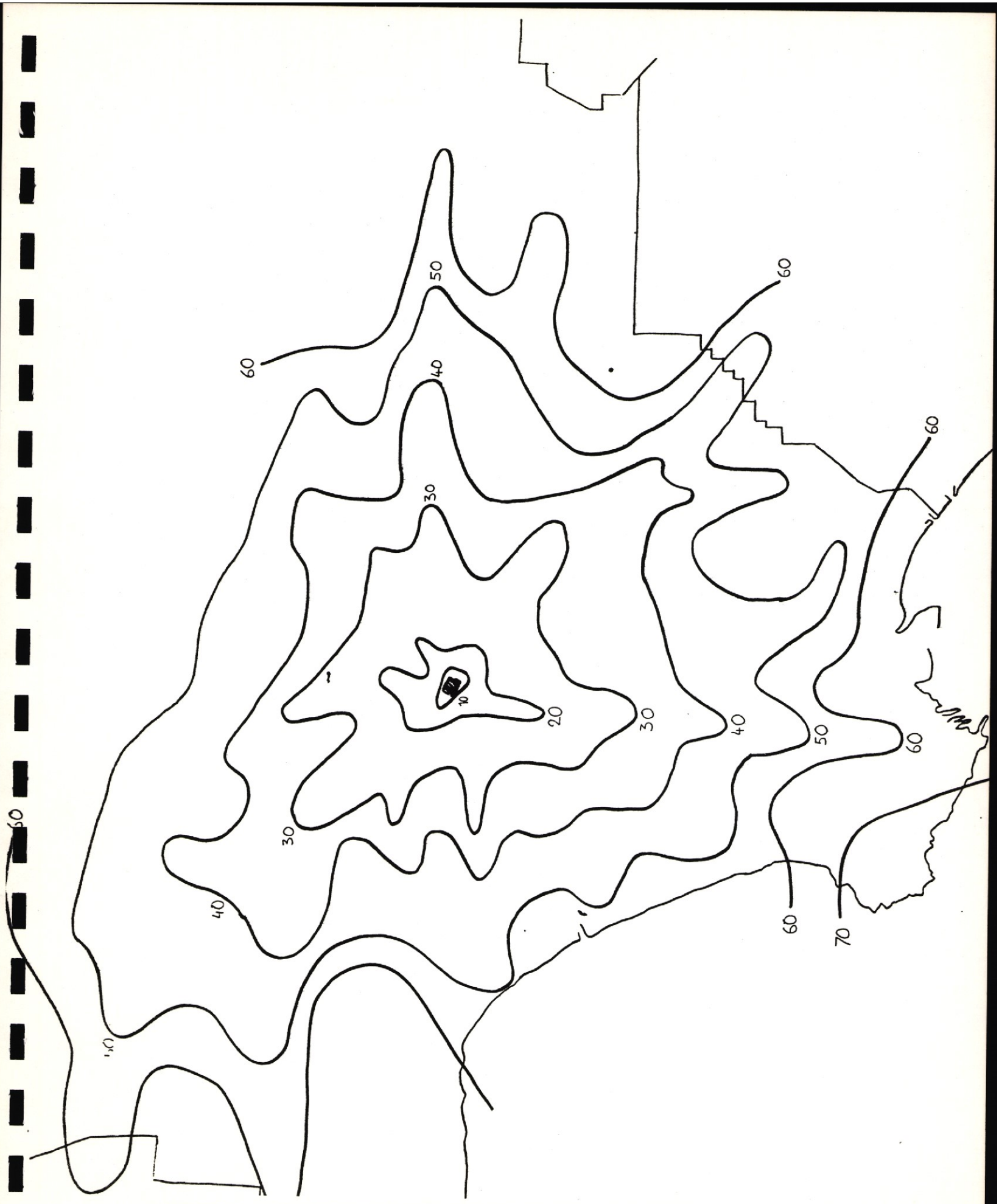

FIGURE 2 TRAVEL TIMES BETWEEN DOWNTOWN LOS ANGELES AND DIFFERENT PARTS OF THE COUNTY, ALL-BUS ALTERNATIVE

Arthur D. Little, Inc.

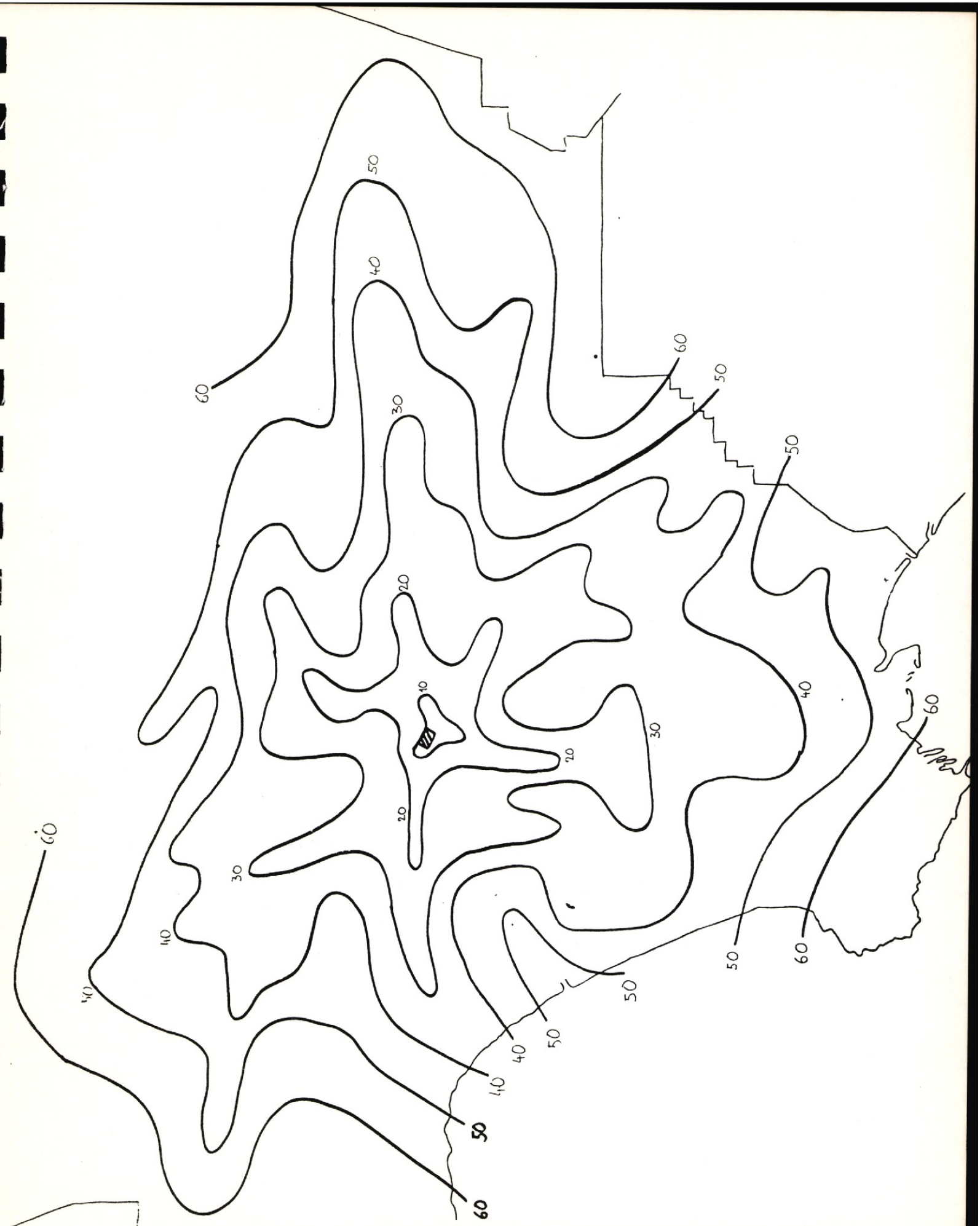

FIGURE 3 TRAVEL TIMES BETWEEN DOWNTOWN LOS ANGELES AND DIFFERENT PARTS OF THE COUNTY, PROPOSED BALANCED TRANSPORTATION SYSTEM

FIGURE 4 TRAVEL TIMES BETWEEN LAKEWOOD AND DIFFERENT PARTS OF THE COUNTY, EXISTING SCRTD BUS SYSTEM

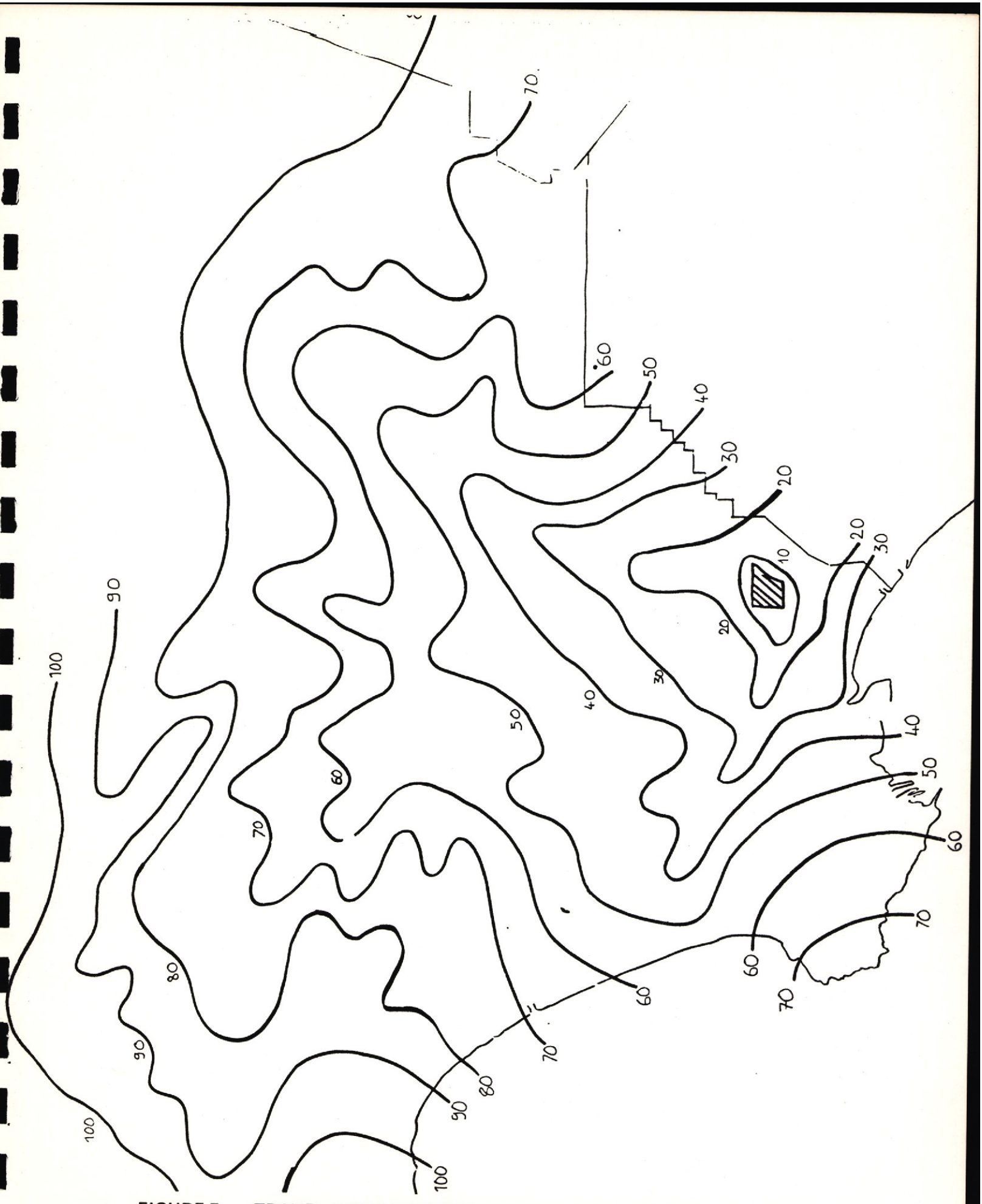

FIGURE 5 **TRAVEL TIMES BETWEEN LAKEWOOD AND DIFFERENT PARTS OF THE COUNTY, ALL-BUS ALTERNATIVE**

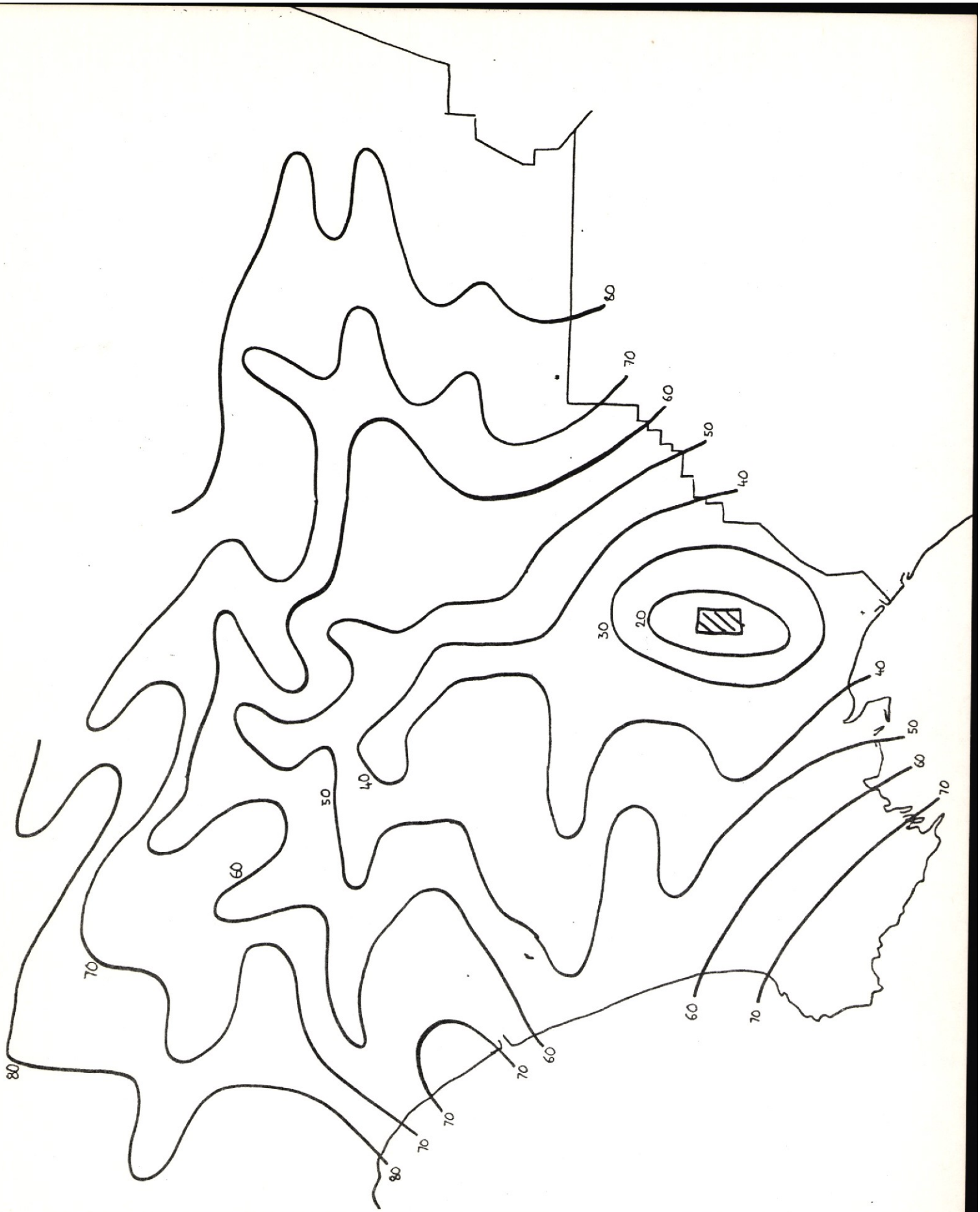

FIGURE 6 TRAVEL TIMES BETWEEN LAKEWOOD AND DIFFERENT PARTS OF THE COUNTY, PROPOSED BALANCED TRANSPORTATION SYSTEM

Table 1 presents some typical trips and the time saved with the planned rapid transit system over current travel by bus.

As an example, a resident of Northridge who works in Terminal Island must currently spend five and one-half hours a day getting to and from work by bus. When the transit program is completed, he will be able to make this tround trip in 2½ hours. A person who wants to go from Beverly Hills to the Los Angeles CBD must now spend 75 minutes by bus; in the future he will only have to spend 22 minutes making the same trip.

Not only residents will realize the benefits of the improved transit system. Many visitors, including tourists and businessmen, will find available a transit system which interconnects the major attractions of the area – the Miracle Mile, the Civic Center, Griffith Park, UCLA, etc. Businesses will be able to have deliveries made and send people from one business center to another in much less time than is required today and at less cost. Indeed, one of the most significant effects of the rapid transit system will be to tie these centers together. This means also that shoppers can move among shopping areas with much greater convenience and that employees can shop in a nearby or more distant shopping center during their lunch hours or after work with much greater convenience.

b. Expansion of the Range of Service: Impacts on Coverage

Today those who are served by the bus system can reach certain destinations, even if with a substantial expenditure of time. But many residents and destinations simply are not served at all or are not served effectively. One of the effects of rapid transit will be to extend the range of travel opportunities for transit users to new places. With the transit improvement program effectuated, it will be possible to travel almost anywhere in the county and neighboring parts of Orange County conveniently by rapid transit lines and connecting feeder buses. New access will be afforded for residents of central Los Angeles to the beach, to Griffith Park, and to suburban employment and shopping centers.

For many people, the rapid transit system will offer the ability to go to more distant places in the same time rather than to reduce travel times, by bringing within the same time-distance a wider area of opportunities for work, shopping, recreation, and entertainment. At the present time most Los Angeles residents are apparently unwilling to spend more than 30 minutes each day commuting to work (a round trip of one hour). As a result, job choices are based to a substantial extent on the location of the job and choices of residence are based on job location.

The effect of the rapid transit system will be similar to the past effects of the freeway system in Los Angeles; it will increase total accessibility within the area. For those who prefer to live closer to where they work and near activity centers, the system will make it possible to get there faster and more conveniently.

TABLE 1

COMPARISON OF TRAVEL TIMES BETWEEN TRANSIT IN 1990 AND EXISTING BUS SYSTEM FOR SELECTED TRIPS
(minutes)

Trip	Existing Bus System	Estimated Transit 1990
Culver City to Downey	70	44
Inglewood to Los Angeles CBD	35	17.5
Van Nuys to Los Angeles International Airport	73	29
Lakewood to Los Angeles CBD	70	22
Glendale/Burbank to Los Angeles International Airport/El Segundo	122	36

Source: Alan M. Voorhees & Associates, Inc.

c. More Frequent Service

Those who are presently dependent on the bus system in Los Angeles find that they must tolerate fairly long waits for a bus or plan their trip very carefully to avoid excessive waiting time. One of the first effects of the proposed transit programs will be to increase the frequency of bus service so that no line has service less often than every 15 minutes. In the future, with the rapid transit system in place, service on the major lines will be much more frequent, up to every 1½ to 2 minutes during the rush hours. As a result residents will have much more flexibility in choosing to travel and will not have to spend time waiting at bus stops. For many this will mean greater travel opportunities. For the elderly in particular, and at night, there will be a greater sense of security since less time will have to be spent on a deserted street.

2. Benefits to Those Not Presently Served

a. Expanded Coverage

There are many areas of the county where transit service is presently nonexistent or can be considered nonexistent because of the distance between bus stops and homes relative to the type of service offered.

The rapid transit program will provide service to areas not now served at all as well as to areas without effective service. Generally, any area of Los Angeles County which does not at present have a bus stop within two to three blocks of a home cannot be considered as effectively served by transit, absent parking facilities at bus stops, or rapid line-haul service between bus stops and key destinations. The rapid transit and improved bus program will extend new service into these areas through a combination of:

- New rapid transit lines in these areas with stations within walking distance,
- New feeder bus lines connecting to rapid transit stations and offering local service,
- New bus-on-freeway service in areas not served by mass rapid transit facilities, and
- New large parking facilities at transit stations for park-and-ride service where transit stops are not within walking distance of homes.

b. Increased Frequency of Service

Even where a bus line passes through an area, that area cannot be said to be served by transit if the frequency of service is so low that a person must either plan every trip to coincide with the service or wait long times at bus stops.

The rapid transit program and the bus improvement program will make possible much lower headways (times between buses and trains) and thereby increase the frequency of service dramatically.

The increased frequency of service will be significant in particular in terms of the choices available for making trips which are not prescheduled – for instance, shopping trips, visits to friends, trips to government offices, to have lunch, and to art museums and galleries. At present there is little choice for the unexpected trip since bus service is too infrequent to provide a real alternative. In the future there will be greater choice in going by car or by transit, knowing that public transit service is actually available. This means that many families can share automobile use more freely. A mother will not have to have the car around all day, assuming a first or second car exists, in the event that she might need it. It could be given to a teenager for a particular trip even if she knew that she wanted to go somewhere that afternoon. Likewise, a child would know that he could meet his friends someplace without first having to see if there was a way to get there.

3. Benefits to Automobile Drivers Who Would Prefer to Use Transit to Go to Work

Many of those who commute to work by automobile today would prefer to use transit if service were more reliable and more convenient, but most simply cannot afford the extra time required or the uncertainty regarding time of arrival. Employees know that they must be at work at a particular time and they must plan their trips accordingly. Many cannot afford the extra time required to make that trip because of other duties, such as getting children ready for school. Some would use transit because it was cheaper, particularly with gas prices rising. Businessmen cannot afford to waste excessive time in travel.

a. Increased Regularity and Predictability of Service

For the commute to work, one of the primary advantages of rapid transit will be to create a regular and predictable means of getting to work. For the commuter this will be the critical difference. At present, since buses must compete with automobiles for road space, a particular trip may require 20% or 50% more time than normal on a particular day because of excessive congestion. For the employee who cannot afford the risk of arriving late, this factor alone may make transit use infeasible. The mass rapid transit system, operating on exclusive guideways, and the bus-on-freeway system operating in exclusive lanes, will reduce this degree of uncertainty to a minimum. It will be possible to maintain regular schedules and running times, assuring to the potential passenger that a particular trip from home to work will take about the same time each day, making travel by transit even more reliable and predictable than by automobile. As experience with BART in the San Francisco Bay Area and with rapid transit in other metropolitan areas has shown, this is often the critical difference in attracting patronage for work trips.

b. Travel Time-savings and Use of Time

Another incentive for transit use to the present automobile user will be reduced travel times by transit. In many cases a trip will take less time on the rapid transit system than it will by automobile. This is most likely to be the case during hours of peak movements: during the morning and afternoon rush hours and, for certain destinations, the noon hour shopping period and even for certain weekend trips to the beach. When the time required to park is added to automobile travel times, transit will often offer better service. Table 2 compares projected transit and automobile times, door-to-door, for selected trips in 1990.

TABLE 2

COMPARATIVE TRAVEL TIMES
AUTOMOBILE VERSUS TRANSIT – 1990
(minutes)

	Auto	Transit
Torrance to Hollywood	53	43
Van Nuys to El Segundo	40	29
Beverly Hills to LA/CBD	36	11
Lakewood to LA/CBD	47	22
Glendale to LAX	66	36

Even for trips where it is still faster to go by automobile, many residents will find that they prefer to spend that time riding, when they can finish work not done, read the newspaper, or do something else which driving does not permit. Time spent on transit is *usable* time whereas time spent in driving and parking cannot be devoted to anything else, except conversation. It has long been known that long-distance commuters in particular choose to ride public transit because they can use the time required to do other things.

Thus it is likely that those who travel the longest distances to work will experience the greatest benefits from the rapid transit system, both because time-savings by transit are likely to be greater, as compared to automobile use, and because the time is sufficiently great to permit the actual time spent to be used meaningfully.

c. Savings in Costs

For many potential travelers, transit will offer substantial cost savings over travel by automobile. For most, it is unlikely that transit will cause them to forego car ownership, if they already have a car or can afford to have a car, since the automobile will continue to be

the primary source of mobility in Los Angeles. But for some the availability of rapid transit will mean that a second or third car will not be a necessity. And for many, the actual daily cost of going to and from work will be less by transit than by automobile and the savings will be enough, along with other things, to make transit more attractive.

At present, 48% of Los Angeles households own more than one car; 31% of households own one car. Seventeen percent own no car, a proportion unchanged since 1960. In most families which own one car and are not well served by transit, that car must be used by the family breadwinner in making the trip to work. As a result the rest of the family has extremely restricted mobility during the day, being dependent on friends and relatives, walking or bicycling, or infrequent bus service. This is the reason that the number of trips made by persons in households having only one car is much lower than in households having two or more cars. As incomes increase, the tendency for many of these households is to acquire a second car, if at all possible, thus increasing the proportion of their disposable income which must be used for transportation. The availability of a good rapid transit system can have a very important effect on the finances of such households by making it possible for the worker of the family to go to work by transit, freeing the family car for other uses during the day and allowing much more effective and intensive use of that one car. This means that for a household with an annual income of about $12,000 (average family income in 1972 for households owning cars) the total proportion of family income spent on transportation can be reduced from $1,000-$1,500. This is equivalent to approximately 40% of the average budget for food.

Even for households who already own two cars, transit can significantly increase overall family mobility and eliminate the eventual need for a third car by making it possible for trips to work to be made by transit or for teenagers to use transit for their needs. Without a good transit system, it seems inevitable that for those who can afford it, third and fourth cars will be seen as necessities for families with children of driving age. A second car will be a necessity for couples with small children. Otherwise, one or more members of the family will be without means of transportation. For these families, the ability to avoid purchase of another car will mean a total annual savings of about $1,000.

4. Benefits of the Rapid Transit System to Automobile Users

Even future automobile users, who cannot or for various reasons choose not to make use of the transit system, will derive benefits from the rapid transit program. These benefits will come from a variety of impacts: reduction in congestion on freeways and surface streets during rush hours and prime shopping times, and during times of mass entertainment events, reduction in the competition for scarce parking spaces, and improved door-to-door travel times resulting from the reduction of congestion and waiting time trying to park.

a. Impacts on Congestion within Major Centers

Although the proposed transit improvements cannot be expected to cause a massive diversion from current automobile use to transit use, they will have significant impacts on congestion that is occurring and will otherwise occur in major activity centers of the Los Angeles area. Without transit improvements and the degree to which improvements can reduce future automobile usage in travel to and within these areas, congestion will be much worse. The impacts will be most noticeable in the Los Angeles business district, along Wilshire Boulevard and Sunset Strip, and in other major activity centers in Los Angeles, such as the Long Beach business district, Beverly Hills, Westwood, Santa Monica, Hollywood, Burbank, Van Nuys, the Los Angeles International Airport, and El Segundo.

While current congestion is likely to remain, the primary impact of the rapid transit system will be to avoid a worsening of congestion within these high activity centers.

b. Impacts on Congestion in Major Freeway Corridors and on Arterial Streets

Although the proposed rapid transit system may only carry a small percentage of total trips made in Los Angeles County during a typical day, many of those trips will be made during the peak hours, thereby relieving the only real traffic problem – congestion during the rush hours.

Unless congestion is to reach intolerable levels in these corridors, either a rapid transit system must be built or many more freeways must be built. Freeway construction could probably reduce congestion on the freeway system, as it has in the past. But it could do little about congestion within the major centers and would in fact probably aggravate it by dumping more cars into them.

C. ACCESS TO OPPORTUNITIES – SOUTH CENTRAL AND VAN NUYS

1. Introduction

This impact assessment examines the skill and occupational levels which exist currently in the central business district of Los Angeles. Comparisons are made between skill levels based on job demand and the skill levels of residents in two nearby communities. The results suggest that one community has an overall occupational skill level which matches fairly well the job demands in the CBD; in the other community studied, supply does not match demand.

This effort suggests that mass rapid transit (MRT) will have different employment impacts on the two communities studied. Access to employment opportunities will be enhanced for the community with the adequate skill match; but improved access will make little or no difference to the community which has a very poor skill match.

This particular analysis was undertaken to assess the often repeated claim that MRT will make job opportunities available to all areas – i.e., that rapid transit per se yields increased employment. While this work is but a summary effort, it does suggest that SCAG or SCRTD may wish to undertake a similar and more comprehensive analysis of several other communities which will be extensively served by the rapid transit program. The resulting impact studies would be educational to both the public and the respective political bodies.

It will be noted that the data used in this study were gathered in various studies in 1968-72. The data used are illustrative but not sufficiently accurate to make decisions based on this impact statement. It is, however, a relevant assessment of claims relative to MRT and job opportunities.

2. The Regional Picture

Prior to examining the selected communities, it is important to understand the concept of employment opportunities within the Los Angeles region. Regional employment opportunities can generally be placed in the following classifications: service, manufacturing, trade, transportation, finance, construction, government, and agriculture.

If one were to divide the region into specific employment opportunity sectors, it would be possible to come up with any number of sectors or activity centers which encompassed some, if not all, of these employment categories. One such center is the central business district for the Los Angeles metropolitan region. The employment characteristics of the CBD can be characterized as follows: service, government, trade, finance, manufacturing, transportation, and construction.

When these employment categories are compared with the characteristics of the region as a whole, it can be said that agriculture is not a possible option within the CBD. In ranking the number of possible employment opportunities in these categories for the CBD compared with the county, this difference in location of potential job opportunities should be noted. (See Table 3.)

TABLE 3

RANKING OF JOB CATEGORIES
FOR LOS ANGELES COUNTY, THE CENTRAL DISTRICT, AND THE CENTRAL BUSINESS DISTRICT

Los Angeles County	Central District	CBD
1 Service	1 Service	1 Service
2 Manufacturing	2 Wholesale/Retail	2 Government
3 Trade	3 Manufacturing	3 Trade
4 Transportation	4 Finance	4 Finance
5 Finance	5 Government	5 Manufacturing
6 Construction	6 Transportation	6 Transportation
7 Government	7 Construction	7 Construction
8 Agriculture		

Similarly, if one were to compare the employment opportunities of other activity centers with the region, it would be determined that certain centers have very specialized employment opportunities while others have more diverse opportunities. This analysis addresses the question: do the skill and occupational types of residents in selected communities match up with the needed skill and occupational types of the central business district?

3. The Methodology

Employment data have been gathered for the central business district. This information has been aggregated according to the skill and occupational types required by the CBD. These skill types have been examined over time to determine if there have been changing occupational patterns within the CBD over the past decade.

Two proposed MRT corridors, which have been slated to pass through the communities of Van Nuys and South Central Los Angeles, have been identified. The communities of Van Nuys and South Central Los Angeles have been selected in order to examine skill match. The purpose was to determine to what extent the skill levels of residents of these communities matched the skill level needs of the CBD.

It was logical to assume that running a mass rapid transit system through these communities would result in increased access to employment opportunities if the residents' skills are salable in the CBD. One could ask the question, is it reasonable to assume that the system could attract new riders – based on the assumption that they would now have increased access to employment opportunities via MRT?

4. Limitations

It should be pointed out that employment opportunities are to be found throughout the region, and that taking the CBD is biasing the question of access to employment. This weakness is acknowledged. It is suggested, however, that the CBD as a place of potential employment for certain skill types is more viable than other employment opportunity centers located elsewhere in the region might be. It is argued that the proposed MRT routes use the CBD as the hub of trip-to-work patterns, and that at present, there are relatively few concentrated employment opportunities at the extremes of any of the proposed MRT corridors.

It is further argued that one rationale for corridor location, and subsequent support of the MRT by low-income and transit-dependent population, has hinged on the statement that this system will increase access of these individuals to employment opportunities in the CBD.

5. Regional Employment Opportunities

Los Angeles County, the Central Los Angeles area, and the central business district (the smallest of these units) can be thought of as varying degrees of scale for employment opportunities within this region. When the rankings for employment opportunities within job sectors for each of these areas are compared, it can be shown that the service category ranks as the highest employment opportunity for each of these three locations (Table 3).

The trends over the past decade in both the CBD and the central district have been toward a decline in the manufacturing industry. The Central Los Angeles district which includes a larger area than downtown clearly illustrates this. The employment trend from 1961 to 1968 is shown below; the total employment figures show a net loss of 4100 jobs for the period:

1961	1962	1963	1966	1967	1968
640,500	637,000	594,000	606,100	594,300	600,400

While losses occurred in the wholesale/retail trades and in manufacturing, the net job loss effect was lessened by the increase in number of jobs in the service and finance sectors.

The classification of "service" is confusing. Included in it are professionals, engineers, chemists, draftsmen, dentists, lawyers, doctors, computer programmers, school teachers, research workers, as well as clerical personnel. The data are not available to be able to accurately list all of the job types in the CBD as the U.S. Census can for specific census tracts. It is speculated here that the majority of the service jobs in the CBD are in fact more professionally-related than of the lower skill variety.

The projected trend for the county as a whole is reflected in Table 4. The largest increases will be in service, trade, and finance. The construction industry is expected to be the largest loser.

We have indicated above that wholesale and retail trade as well as manufacturing have been decreasing within the central business district. Projections suggest that it will be the service, trade, and finance sectors which will experience the largest growth within the CBD in the years ahead.

Thus one must ask what types of skill levels do the surrounding communities possess for meeting the expected demand in the future? Or it could be asked, will the proposed MRT corridors provide the increased access to employment for those individuals who possess the skills to fill the employment opportunities which will emerge within the CBD?

6. Two Communities

In the following pages, we examine two community profiles – those of Van Nuys, in the San Fernando Valley, and South Central, south of the CBD. For each community, information has been compiled on employment, mode of travel to work, percent employed and unemployed, and the approximate number of trips currently made from these communities to the CBD. These communities were selected because MRT corridors have been proposed to pass through both, and the population of each comprises primarily different ethnic characteristics.

a. Skill Profiles

Van Nuys has a heavy concentration of the higher skill levels. The combination of professional/technical, management/administration, and sales comprises 45% of the skill types. Clerical, craftsmen, and service comprise 47% of the skill types.

By comparison South Central Los Angeles' total for higher skill types is 11%, while the clerical, craftsmen, and service skills total 30%. In other words, 45% of the Van Nuys residents possess higher skills compared with 11% for South Central. These figures suggest that job opportunities for these communities speak to entirely different job markets, except in the service and clerical areas where both communities seem to be on a more even basis (Table 5). It could be anticipated that improved access to employment for Van Nuys residents would

TABLE 4

PROJECTED JOBS BY OCCUPATION TYPES, 1970-1975 FOR LOS ANGELES COUNTY

	1970	1972	1975	Change 1970-72	Change 1972-75	Percent	Net
Total	3,134,600	3,176,900	3,368,400		191,500	6%	
Agriculture	16,200	17,100	16,600	900	-500	-2	400
Mining	11,700	11,300	12,100	400	800	7	1,200
Construction	138,000	133,900	126,200	-4,100	-7,700	-5	-11,800
Manufacturing	836,300	813,200	848,000	-23,100	34,800	4	11,700
Transportation	203,300	199,900	210,700	-3,400	10,800	5	7,400
Finance	184,000	192,100	208,500	8,100	16,400	8	24,500
Service	913,000	945,000	1,024,300	32,000	79,300	8	111,300
Government	126,100	128,800	137,500	2,700	8,700	6	11,400
Trade	706,000	735,600	784,500	29,600	48,900	6	78,500

Source: California Community Labor Market Survey 1967-1968, State Department of Employment, Research and Statistics, September 1968.

increase opportunities for white collar professional jobs, while for South Central Los Angeles greater access would be afforded for service-oriented jobs. It has not been possible, in the limited period of this study, to provide the breakdown of job types by ethnicity and hence to determine, for example, if the holders of the service jobs are equally distributed among the various ethnic groups.

TABLE 5

MAJOR OCCUPATION GROUP OF LONGEST JOB SINCE LEAVING SCHOOL FOR THOSE ON FULL-TIME SCHEDULES
(percent)

	South Central	Van Nuys
Professional and Technical	6%	17%
Managerial and Administrative	3	16
Sales	2	12
Clerical	11	17
Craftsmen	8	13
Operatives, except Transportation	13	7
Transportation Equipment Operators	3	2
Laborers, except Farm	4	2
Service Workers, except Private Household	11	14
Private Household Workers	5	0.5
Farm Workers	3	0.1
Other – Not Available	31	

b. Employment Characteristics

According to the latest available data,* 13.1% of the population in South Central Los Angeles is unemployed, compared to 6.7% unemployment for Van Nuys. Table 6 indicates that transportation was not given as a reason for residents in South Central not being able to find employment even if they wanted it: for the vast majority, family obligations and poor health were given as reasons. Lack of necessary skills, experience, or education was given by 20% of the community residents as either a primary or secondary reason for being unable to secure a job. Unfortunately similar data were not available for Van Nuys, but given the low unemployment rate there, it is likely that no one particular reason would have been cited for inability to obtain employment.

*U.S. Department of Commerce, Bureau of the Census, *Employment Profiles of Selected Low-income Areas, Los Angeles, California – Area II*, PHC(3)-15, 1970.

TABLE 6

PERSONS NOT IN THE LABOR FORCE WHO WANT, MIGHT WANT, OR WOULD WANT A REGULAR JOB NOW, AND REASON NOT SEEKING WORK: ALL RACES

	Reasons Not Looking for Work								
	Main Reason							Secondary Reason	
Total Not in Labor Force Who Indicate Desire for Work	Family Responsibilities	Poor Health, Illness, or Disability	Inability to Find Work	Transportation Problems	Employers Think Too Young or Too Old	Lack of Skill, Experience, or Education	All Other Reasons	Inability to Find Work	Lack of Skill, Experience, or Education
73,852	26%	40%	3%	0.7%	0.6%	4%	26%	10%	16%

Source: U.S. Department of Commerce, Bureau of the Census, *Employment Profiles of Selected Low-income Areas, Los Angeles, California – Area II,* PHC(3)-15.

As shown in Table 5, 17% of the employed in Van Nuys have high skill levels (i.e., professional/technical), compared to 6% in South Central Los Angeles. Matching the skills of the two communities with those required in the CBD is necessary for a determination of the impacts of an improved transportation system on access to employment.

Table 7 shows the number of jobs in the CBD and their distribution by job type. The largest category is that of service employees. However, it should be remembered that "services" in this context refers to technical personnel, engineers, draftsmen, dentists, physicians, computer programmers, lawyers, teachers, etc. These are clearly the equivalents of the professional/technical and managerial/administrative areas jobs of Table 5. There is no question but that these skill levels are on the increase in the CBD. The net result is that the impacts of MRT on access to employment will be greater for Van Nuys than for South Central Los Angeles, simply because the employment opportunities better match the skill levels of the residents of Van Nuys than those of residents of South Central Los Angeles.

Impacts on employment opportunities are further differentiated if we ask the question, what will be the employment opportunities for the low-income and transit dependent population in the construction phase of the MRT? This analysis has not addressed itself to this question directly. However, it appears probable that if past patterns prevail, those individuals who most need employment are the least likely to be employed in the construction phase. Three major reasons support this assumption.

TABLE 7

EMPLOYMENT BY OCCUPATION TYPE
LOS ANGELES CENTRAL BUSINESS DISTRICT – 1970

Skill Type	Number of Jobs	Percent of Total Jobs
Contract Construction	4,550	2%
Manufacturing	29,700	8
Transportation, Utilities	23,700	7
Trade	62,900	18
Finance	61,950	18
Service	86,450	26
Government	68,650	21
Agriculture, Fisheries	–	–
Total	337,900	100%

Source: Southern California Association of Governments, prefacing remarks to the Regional Transportation Networks, February 14, 1974.

First, participation in the construction phase requires membership in one of several unions. Low-income minority individuals are greatly under-represented in these unions, and there is no indication that this situation will change in the near future.

Second, the skills necessary to perform many of the specialized jobs that will be required are lacking among the very population that policy makers apparently would like to benefit from employment in the construction phase. There is little likelihood that a training program will be undertaken specifically to prepare the target population for the expected employment opportunities.

Finally, it should be recognized that only a few contractors will be awarded contracts. They in turn will subcontract to only a few other contractors. Unsuccessful bidders may have to lay off workers or, at best, will not be capable of hiring new workers – the net effect being that the potential new jobs created by the construction activity will be offset by the slowdown in hiring or the elimination of jobs in the section of the industry which did not obtain contracts.

c. Travel Modes

Modes of travel to work also differ between the communities. While the auto is the predominant mode used by residents in both communities, incidence of auto use in Van Nuys is higher than in South Central Los Angeles (Table 8). Four percent of the residents in Van Nuys indicated that they walked to work, compared to 8% of the South Central residents. The striking difference is in the use of public transportation: 22% of the South Central residents said that they used public transportation to get to work, compared to only 2% of the Van Nuys residents. It is clear from this information that the residents in South Central Los Angeles are more dependent on some means of public transportation than are the residents of Van Nuys.

Table 9 indicates that the majority of the trips to work generated by residents in South Central Los Angeles are made within the community. Only 17% of the residents indicated that their trip to work was made elsewhere in the city and 24% indicated that they traveled outside the city

A recently completed report prepared by the School of Architecture and Urban Planning at UCLA* showed that in terms of access from home to places where one might reasonably expect to obtain a job based on existing skill levels, those individuals in the $0-4,000 income bracket and those individuals in the $15,000 and above income bracket had the greatest access via automobile to employment opportunities within 15 minutes' driving time. A similar study conducted by the Joint Center for Community Studies (1973) suggested that within one predominantly low-income black community (Southeast Los Angeles) a good number of the residents also work within that same community. These findings are also supported by LARTS data and the SCRTD consultant reports. The implication of these studies is that a large number of the trips to work of the residents in the South Central corridor are intra- and not inter-community trips.

Unfortunately similar data were not available about Van Nuys. We believe, however, that the majority of the trips to work are made outside of the community itself.

7. Employment Impacts

If the matching of skill types with skill needs can be used as an indicator of access to employment, then it can be said that for the residents in Van Nuys there is a potential for greater access to employment as a result of mass rapid transit. The employment impacts on South Central Los Angeles are not as apparent. It is true that some employment opportunities will become available to South Central residents within the CBD as a result of MRT. But given that the majority of these individuals currently work within South Central Los Angeles and their skill levels do not match well with the skill needs of the CBD, positive employment impacts for them are likely to be minimal.

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*Prototype State-of-the-Region Report for Los Angeles County, 1973.

TABLE 8

MODE OF TRANSPORTATION TO WORK
SOUTH CENTRAL LOS ANGELES AND VAN NUYS

	South Central	Van Nuys
Bus, Streetcar, Taxi	22%	2%
Subway or Rail	–	0.01
Walk	8	4
Auto	68	93
Other	2	2

Source: U.S. Department of Commerce, Bureau of the Census, *Employment Profiles of Selected Low-income Areas, Los Angeles, California – Area II,* PHC(3)-15.

TABLE 9

USUAL PLACE OF WORK
FOR RESIDENTS OF SOUTH CENTRAL LOS ANGELES

	Percent
Inner City Sample Area	52%
Remainder of City	17
Outside City Limits	24
Different Address Each Day	5

Source: U.S. Department of Commerce, Bureau of the Census, *Employment Profiles of Selected Low-income Areas, Los Angeles, California – Area II,* PHC(3)-15.

While the above analysis does not provide a simple remedy to the demand/supply labor skill problem, it does suggest that if mass rapid transit is to be meaningful to all the communities, it should be planned so that most of the citizens who will pay derive some benefits. The analysis also suggests that, specifically for low-income communities, the demand/supply problems of skill match might require a considerable amount of time to resolve. In this event, other employment benefits must be forthcoming in both the construction and operations phases of the system – if these communities are to ever substantially benefit from employment to be provided by the system. In addition, SCRTD could facilitate employment opportunities by locating yards, shops, and other support facilities within these communities. In this way, the transit industry itself becomes a direct employer.

It is strongly recommended that SCRTD undertake a systematic analysis of most, if not all, of the communities to be served by mass rapid transit to determine to what degree each community will potentially derive employment benefits from the system. In this way, salient issues can be shaped for both the residents of the communities and the appropriate decision makers.

D. IMPACTS ON TRAFFIC CONGESTION AND EASE OF AUTOMOBILE TRAVEL

1. General

Despite an excellent street and freeway system, substantial congestion occurs in many parts of Los Angeles County, with the greatest congestion occurring in the central areas where there are substantial employment, population, and activity centers, including shopping areas, museums, galleries, governmental offices, and recreational facilities. Congestion is caused simply by the attempt of many people to reach the same destination or to travel in the same corridor at the same time. In areas of high population *and* high employment density (and the high presence of other activities which these indicators imply), congestion is the almost unavoidable result of the attractiveness to people of activity centers themselves. In other words, it is in the nature of such centers to attract significant numbers of people at the same times and their functional roles are dependent on so doing. An additional form of congestion results from the attempt of many people to move through a travel corridor at the same time and results in part from the nature of the transportation system and the extent of demand for movement in various directions.

In the Los Angeles area, both of these contributing causes result in the most severe congestion in the regional core, which is centrally located geographically and serves both as a node of high activity in itself and as a corridor through which many trips must be made to and from other destinations in the region, as a result of the geometry of the freeway system. Thus, in 1967 more than 40% of all vehicles counted crossing cordon lines around the central Los Angeles area did not actually have destinations in that area.

Rapid transit and auxiliary feeder transit systems can directly affect both of these sources of congestion, first by making it possible to move to, within, and out of high activity centers by a mode which requires far less space than the automobile for the quantity of travel desires served, and secondly, by providing an alternative and more space-saving source of movement among non-core areas which reduces the amount of traffic which must pass through the core area to take residents to their destinations outside the core.

Despite the marvelous flexibility which it offers, the automobile is a very inefficient carrier of people both to and through high activity areas. It consumes a large amount of space in a travel corridor for the trips it serves. Therefore, to the extent that people choose to travel by transit in a highly traveled corridor or to an activity center, congestion on the freeways and the streets can be reduced out of proportion to the number of persons diverted to transit. For example, if a lane of freeway is carrying 1800 cars per hour during a peak period at an average speed of 30 mph, approximately 2200 people are able to move a given distance in that lane in one hour. If only 20% of those people are offered a transit alternative which they choose to use, traffic on that lane can be reduced to 1450 cars per hour, increasing average speeds to 50 mph, an increase of more than 60% significantly reducing travel time by

automobile. It is also true of course that a rapid transit line can move a much larger number of people through a given corridor in much less space than a freeway. Rapid transit has a potential capacity to carry 40,000 people per hour from one place to another on the equivalent of less than one lane of freeway; to achieve the same capacity for autos would require almost 20 lanes of freeway.

In addition, rapid transit can have a significant impact in reducing traffic congestion within high activity centers and in reducing parking requirements by eliminating the need for automobile movements within these centers which are solely related to the need to get in and out of the area. This is a significant problem in several activity centers in the Los Angeles area, including not only downtown Los Angeles and other parts of the regional core to the west, but also other employment centers and shopping and recreational attractions, such as Long Beach, Dodger Stadium, Los Angeles International Airport, Burbank, the Pasadena business district, Anaheim, UCLA, and South Gate.

The greatest effects of rapid transit on reducing traffic congestion will occur where rapid transit is provided on separate rights-of-way from automobile traffic, since this will increase total transportation capacity in the area and will not reduce facilities available for automobile traffic, such as would occur if there is a significant increase in bus traffic on the streets and freeways.

2. Current Traffic Conditions

Today, the population of the SCAG six-county region generates about 27.5 million daily person trips, an average of about 2.75 daily trips per person. About 17 million trips, or 62%, are made by Los Angeles residents and probably more than 80% of regional trips occur in part in Los Angeles County. At present, over 90% or the overwhelming majority of those trips are made by automobile. Work-related trips make up about 30% of total trips and these are essential trips. Half of all trips are home-related and include trips for shopping, personal business, recreation, and visits to friends. More than three-fourths of all trips are relatively short in terms of the size of the region, being less than eight miles each way. However, almost one-fourth of all trips are more than eight miles in length and the average home-to-work trip exceeds 10 miles. Transit patronage at present is more common on short trips than on long trips because of the excessive amount of time required to travel by bus for long distances as compared to travel by automobile, except where exceptionally rapid bus service is offered, as on the El Monte Busway.

Since Los Angeles County has more than 70% of the population and 76% of the employment in the region, the vast majority of daily trips are made in Los Angeles County. Despite the existence of a freeway system with more than 400 miles of exclusive right-of-way and an additional 2000 miles of major arterial roadways, traffic congestion occurs not only near the Los Angeles central business district but also as far as 15-25 miles from the central area on all

major freeways. During the rush hours in the morning and afternoon, and sometimes during other periods, freeway speeds fall below 20 mph on significant portions of the freeway system and most of the freeways in the central Los Angeles area have average speeds below 30 mph during these periods.

Even lower travel speeds occur on the major arterials and on secondary streets in the central business district and in other major centers in the Wilshire corridor, and in other areas. Due to congestion, the rush hours have expanded from two to three or four hours in length in some areas, forcing residents to begin their trips to work earlier and to spend more time in travel. Congestion also occurs during prime periods of shopping trips both in the major centers and in more dispersed shopping areas in the central areas.

3. Future Traffic Conditions

By 1990 the number of daily person trips made in the SCAG region is expected to increase by 18 million to 45 million, an increase of 65%, although the population is only expected to increase by 2.7 million according to the latest forecast. These projected increases will result from increased mobility of the existing population, as well as the addition of new population. Trips to and from work would tend to increase at a rate less than the 65% for total trips, but almost all of these are made during the peak periods and already cause substantial traffic congestion today. Although a greater proportion of total traffic will occur outside Los Angeles County in the more rapidly developing areas, the population of the urbanized area of Los Angeles County alone will account for an increase of about five million daily trips, a 30% increase over today's level. Without an improved transit system, the vast bulk of these increased trips will have to be accommodated on the street and freeway system. And many of those trips, even if not destined for the major centers in the regional core, will have destinations which require passing through the regional core due to the structure of the freeway system and of the region.

Employment in the urbanized area of Los Angeles will increase by 260,000, or 9-10%, potentially adding an equivalent percentage of work-trips to the freeway and arterial streets during the rush hours. Most of these will be destined for existing employment centers in the regional core and in other major employment areas in central Los Angeles County, such as Del Amo, El Segundo, Commerce, Downey, and Long Beach.

According to projections by LARTS, without a high level of new freeway construction or diversion to rapid transit, the most severe increases in congestion would occur in the West San Fernando Valley corridor on the San Diego, Ventura, and Hollywood freeways, in the southwestern and airport corridor served by the San Diego Freeway below the Santa Monica Freeway, and in the Wilshire corridor served by the Santa Monica Freeway, Wilshire Boulevard, Santa Monica Boulevard, Sunset Boulevard, and other arterial streets. In addition, significant congestion is projected to occur on the Santa Ana and Artesia freeways, Pasadena Freeway, Harbor and Long Beach freeways, and in the San Gabriel corridor on the San Bernardino and Pomona freeways. These represent the freeways which are already today experiencing the most significant congestion.

In contemplation of increases in freeway congestion of substantial magnitude in several locations, plans have previously been made for substantial expansion of the freeway network in Los Angeles, including projects for a Beverly Hills Freeway, a Laurel Canyon Freeway, the Slauson Freeway, the El Segundo-Norwalk Freeway, connectors to the Glendale, Foothill, and Pasadena freeways, as well as lane additions to other freeways in the area. However, as a result of environmental impacts, potential disruption of areas of high population and employment density, and high costs, there has been substantial citizen opposition to several of these proposals and it is unlikely that some of the new freeways will be built, particularly those intended to serve the regional core. Without freeway expansions or vastly improved transit, extreme congestion is therefore likely to result on the existing freeway and street system if accessibility to and through the central areas is to be maintained. Periods of congestion will get longer and much of the increased peak period load will be forced to the surface streets.

4. Potential Relief of Traffic Congestion from the Rapid Transit Program

a. Effects on Freeway and Arterial Street Traffic

The proposed SCRTD rapid transit program, including short-term priority bus improvements and the long-term mass rapid transit program, will attract substantial increased patronage from persons who would otherwise have to or choose to travel by automobile, especially during the rush hours to and from work. Daily patronage by 1990 is estimated to range from 1.5-3.0 million passengers depending on the cost of gasoline, parking costs, and transit fares. If the cost of gasoline rises to 75 cents, which today does not seem unlikely, if parking costs continue to escalate along with construction and land costs, and if the transit fare is maintained at 25 cents, daily patronage of 3 million is not impossible to achieve.

The conservative estimate of 1.5 million weekday trips by rapid transit would represent an increase in patronage of almost 1 million trips from today's ridership, an increase of 200%, as compared with a 30% increase in total daily trips in southern Los Angeles County. This would represent 20% of the total projected increase in daily trips. If patronage reaches 3 million, transit would account for 40% of the total increase in trips.

More significant in terms of effects on traffic congestion is the increase in peak period work trips taken by transit. It is estimated that 40% of total patronage or from 600,000-1,200,000 trips on the rapid transit system will be work trips (round trips). Work trips in southern Los Angeles County will probably total about 3.5 million in 1990, only a small increase over 1970. The rapid transit system could therefore account for 10-20% of all work trips, most of which are made during the morning and evening rush hours.

Most of the trips diverted from autos to transit during the rush hours will be trips to jobs in the regional core and other major employment centers on the proposed system, and the long work trips which pass through the regional core's freeway system from the northern residential areas to the southern employment centers (and vice-versa) and from the eastern residential areas to the employment locations in West Los Angeles. In both cases, the diversion will be a result of substantially reduced travel times available by rapid transit as compared both to automobile times and current transit travel times. The removal of 300,000-600,000 person trips from the automobile mode during the peak hours is the equivalent of a reduction of 250,000-500,000 vehicles attempting to travel in the peak periods, with more than half of these during the peak hour in the morning and in the afternoon. These diverted vehicles represent a potential demand for 120-240 new lanes of freeway or comparable expansion in the arterial street system.

The primary impacts of the diversion of trips from automobile to rapid transit will be felt on the freeways connecting large residential areas and major employment centers and within the high activity centers of southern Los Angeles County, especially downtown Los Angeles, the Wilshire corridor, Commerce, and the Long Beach central business district – areas which are currently the most congested in the region and which are served by the most congested freeways.

Peak hour transit patronage in the direction of downtown Los Angeles is estimated to be generally as follows, by corridor:

	Peak Hour Trips
San Fernando Valley region	6,000
Van Nuys-Burbank area	4,000
Glendale-Pasadena area	10,000
Northern San Gabriel Valley	9,000
Eastern San Gabriel Valley	3,000
East Los Angeles	9,000
Santa Ana corridor	12,000
South Central and Long Beach	14,000
Southwest and Airport	32,000
Wilshire-Santa Monica	27,000

The diversion of these potential trips by automobile to rapid transit will reduce potential traffic on freeways serving each corridor. In all probability, freeway congestion will ultimately return to approximately the same levels, because those now using arterial streets will shift to freeways. But the arterial streets will themselves become less congested. In some corridors the diversion of work trips from auto to transit will have a significant potential effect on freeway congestion and can eliminate or reduce the need for freeway additions or new construction.

For example, the attraction of 10,000 peak hour trips on rapid transit from the San Fernando Valley and Van Nuys-Burbank areas can reduce potential freeway loads by 8300 automobiles with current occupancy standards. This is the equivalent of almost five additional lanes of freeway and equal to almost 40% of peak hour traffic volumes on the San Diego, Hollywood, and Golden State freeways between these areas and the regional core. In the South Bay area, projected patronage from the Long Beach and southwest areas would be the equivalent of almost 80% of current traffic volumes on the San Diego, Harbor, and Long Beach freeways. Reduction of traffic on these freeways would probably cause a substantial diversion of traffic from arterial streets paralleling the freeway, easing local traffic congestion and improving local circulation.

Similar impacts will be experienced in other corridors. The most significant will be in the Wilshire-Santa Monica corridor where traffic volumes during the peak hours are very high on both freeways and surface streets due to the confluence of traffic moving east-west between West Los Angeles and the regional core, within the core itself, and attempting to get to freeway connections for destinations to the southwest and northwest.

b. Impacts on Automobile Congestion in Downtown Los Angeles and the Regional Core

The May 1972 City of Los Angeles Department of Traffic count of vehicles entering and leaving the downtown cordon area totaled 629,584 vehicles between the hours of 6 a.m. and 10 p.m. These included 506,268 passenger cars, 9293 buses, and 60,023 trucks and other vehicles, either with origins or destinations in the area or passing through. The peak accumulation of passenger cars – approximately 53,400 cars – was immediately before and after lunch. The net accumulation in the area of cars entering downtown during the 7-9 a.m. commuter rush was 47%.

Detailed projections of traffic based on the current estimates of 1990 population are not yet available. Employment in the CBD is expected to increase 5%, although total trips in the southern county are expected to increase by 30%. As the area does not include the freeway loop on which through traffic is concentrated, a 10% increase of trips entering the downtown cordon area is estimated. Without improved transit service and patronage, this growth rate would result in roughly 672,500 vehicles, including 616,300 passenger cars, entering and leaving the downtown cordon area between 6 a.m. and 10 p.m. by 1990. During the 7-9 a.m. peak, this would be an increase to roughly 70,400 passenger cars in 1990 from the 64,000 in 1972. Such traffic growth suggests increased congestion on the downtown freeway loop and on downtown streets during the peak hours and new congestion during the entire day.

Buses carried 21% of all the persons entering and leaving downtown during the day in the 1972 cordon count. With the proposed transit system, 281,000 trips or 36% of all trips with origin or destination in downtown Los Angeles in 1990 have been estimated to be made by transit, with 56% diverted from cars. This would reduce by approximately 115,000 the potential cars attempting to enter or leave downtown during the day without the planned transit program, or a net decrease of 20% below 1972 traffic levels.

The increased transit use for downtown destinations will be the most significant effect of the transit system on traffic congestion. The substantial diversion of downtown-oriented automobile trips will reduce congestion there significantly, make relatively good traffic conditions possible on downtown streets, and reduce the tremendous congestion likely on the freeways through the regional core caused by rush-hour conflicts between those attempting to pass through the area to destinations outside it and those attempting to enter or leave the CBD.

c. Impacts on Traffic Congestion in the Regional Core, Outside Downtown Los Angeles

The regional core area, comprising the Wilshire area, the Miracle Mile, Hollywood, Beverly Hills, Westwood, and Santa Monica, is the most intensely active center in the entire region apart from downtown. This area contains a very large population, sizeable employment, and many of the major institutions in Los Angeles County, including UCLA.

As a result the corridor experiences substantial congestion, not only during peak hours but also during much of the rest of the day, due to the attraction of various commercial and cultural facilities. Because of the high density of population and of employment and the attraction of trips to this corridor, it is a prime candidate for rapid transit. It requires a high-capacity system to accommodate travel demands for both short trips within the corridor and for travel to and from the corridor from other activity centers and large residential areas both near and far.

Total rapid transit trip productions from this area (mid-Wilshire) are projected to be the highest of any area in the region, exceeding 200,000 daily trips. In addition, the corridor will attract a large number of trips from other areas, creating significant demand in both directions, as exists today. At present, large traffic volumes are carried on surface streets in the area, as well as on the Santa Monica and Hollywood freeways. Due to the heavy traffic volumes, two new freeways have been proposed in the past – the Beverly Hills Freeway to connect to the Glendale Freeway and the Laurel Canyon Freeway for north-south traffic to the Hollywood Freeway. Both of these freeway proposals have met with strong resistance from citizens of the areas involved due to the disruption which would occur, the effect on adjacent residential and commercial areas, and the effect on the hilly Laurel Canyon area. These freeways were also expected to involve costs from 10-20 times higher than prior freeways. The proposals do, however, indicate the degree of congestion which occurs in the area and the constant increase in automobile traffic within it.

Without rapid transit, total daily vehicle trips into and out of the Wilshire district alone are likely to reach 1.3 million by 1990. With the transit program, 650,000 trips or 23% of the total trips have been estimated to be by transit, with approximately 70% diverted from autos. This will reduce traffic by approximately 350,000 vehicle trips per day, roughly the estimated increase without the proposed transit program in this district. The diversion of long-distance trips from outside the core area will permit improved local circulation by both local buses and automobiles to serve those who would not find the rapid transit system convenient for short trips.

5. The Contribution of the Rapid Transit Program to Improved Transportation

More than anything else, the proposed transportation program should be seen as a means of improving the overall transportation system in Los Angeles, a transportation system which has to date offered high mobility to the vast majority of the population of the area. The rapid transit system will have two major effects: it will provide an alternative and, in many cases equal or superior, alternative mode of transportation to the automobile; and it will increase the total capacity of the transportation system to handle increased travel demands from the existing population and new growth in the area.

As growth in travel occurs, the transportation system cannot remain static if high mobility is to be maintained and if the Los Angeles urban area is to function to meet the needs and desires of its residents. Increased congestion and reduced mobility will result in loss of leisure time, adverse impacts on economic growth and activity, reduced potential for increased real incomes, and inadequate mobility for those who need it the most. The most important impact of the rapid transit program will be to ensure that residents of the Los Angeles area continue to have the ability to take advantage of the widening opportunities available in the region.

E. IMPACT ON PRIVATE AUTOMOBILE COST

1. Introduction

The purpose of this impact statement was twofold: to determine the operating costs associated with vehicle ownership in Los Angeles County, and to present the data in a format which would permit the calculation of savings resulting from diversion to a rapid transit system.

It should be noted that the out-of-pocket costs of the individual automobile owner in Los Angeles County are but a small part of the total operating costs. There are, as estimated, considerable local and federal subsidies being granted to automobile drivers in the county, including the initial capital cost of freeway construction, the annual freeway maintenance cost, public safety cost, and those traffic department and police administrative costs which can be allocated to traffic control. In San Francisco, for example, it is estimated that 45% of the total police department budget is spent annually on auto-related activities. Though San Francisco may in some ways be a special case, the evidence suggests that such findings are probably pertinent to Los Angeles.

What follows, then, is but one aspect of the question of total automobile operating costs.

2. Automobile Ownership Patterns

a. Registrations

According to the Automotive News Almanac and the California Department of Motor Vehicles, registrations in Los Angeles County as of July 1, 1973, were passenger cars – 3,388,164, and trucks – 614,233, a total of 4,002,397.

b. Household Ownership Patterns

According to the 1970 U.S. Census, Los Angeles-Long Beach had the following household ownership of cars compared with the United States as a whole:

	No Car	One Car	Two or More
Los Angeles-Long Beach	17.2%	45.1%	37.7%
All U.S. Households	20.4%	50.4%	29.2%

Thus, the incidence of households owning two or more cars is 1.29 times the national average. A recent *Los Angeles Times* research study* indicated that 6% of all households in the Los Angeles Marketing Area have three or more cars.

*_Los Angeles Times_ Marketing Research, Los Angeles Auto Market, 1973.

c. Population Projections and Dwelling Units

The population, number of dwelling units, and car ownership patterns in Los Angeles County alone are as follows*:

	1973	
Population	7,096,040	
Occupied Dwelling Units	2,477,958	
Dwelling Units with No Cars	(426,199)	
Households with Cars	2,051,759	100%
One Car	759,151	37%
Two Cars	964,326	47%
Three or More	328,282	16%

d. Number of Miles Driven Annually per Household

Tables 10 and 11 summarize the *Los Angeles Times* research study results regarding the number of miles driven annually for the 2 million households with cars in Los Angeles County in 1973. It was estimated that the median number of miles driven annually was 16,300.

TABLE 10

NUMBER OF MILES DRIVEN ANNUALLY:
HOUSEHOLDS WITH CARS IN LOS ANGELES COUNTY – 1973

	Distribution	
Number of Miles	**All Households**	**Total Number of Miles Driven**
Under 5,000	16%	2%
5,000-9,999	17	7
10,000-14,999	23	17
15,000-19,999	12	13
20,000-29,999	18	26
30,000 or More	14	35
Total	100%	100%
(Base)	(5,177)	(5,177)

*Ibid.

TABLE 11

NUMBER OF MILES DRIVEN ANNUALLY BY FAMILY CHARACTERISTICS: LOS ANGELES COUNTY HOUSEHOLDS – 1973

Family Income	Share of Households Driving: Under 15,000 Miles	15,000 Miles and Over	Distribution of Total Miles Driven
$15,000 or More	30%	70%	30%
$10,000 – $14,999	47	53	32
$ 8,000 – $ 9,999	59	41	16
$ 5,000 – $ 7,999	72	28	15
Under $5,000	84	16	7
All Households	56%	44%	100%
Occupation, Household Head			
Professional, Technical	42%	58%	23%
Manager, Official, Proprietor	43	57	16
Clerical, Sales	54	46	12
Craftsman, Foreman, Operative	54	46	24
All Others	63	37	18
Retired	86	14	7
All Households	56%	44%	100%
Education, Household Head			
College Graduate	44%	56%	23%
Some College	53	47	29
High School Graduate	58	42	30
Some High School or Less	68	32	18
All Households	56%	44%	100%
Age, Household Head			
Under 30	53%	47%	23%
30 – 39	51	49	22
40 – 49	44	56	26
50 – 64	56	44	23
65 or Over	88	12	6
All Households	56%	44%	100%

Source: *Los Angeles Times* Marketing Research.

3. Vehicle Costs

We have reviewed a number of research studies and industry reports detailing operating costs for private passenger cars. The most complete and current study is entitled "Cost of Operating an Automobile," from the U.S. Department of Transportation.* This study considered the costs for three vehicles – an American compact, a subcompact, and a standard size "big 3" four-door sedan operated in Baltimore, Maryland, during 1972.

It is assumed that the most realistic example to use for Los Angeles would be the compact size in that the vast majority of commuters who would be diverted to rapid transit are those who would currently be using the family's second car as a commuter vehicle and have "economized" out of the full-sized sedan into a compact.

If the average household in Los Angeles is driving 16,300 miles annually, it is reasonable to assume that one car is averaging 9900 miles as a commuter vehicle (240 trips a year at 20 miles a round trip + 5100 miscellaneous miles).

Under these assumptions, the costs detailed during the fifth year in the DOT report (Table 12) are representative with the following adjustments for California and 1974:

Fixed Costs – Remain the same.

Gasoline – In Baltimore, it averaged 26.9 cents per gallon. This can be expected to average 50.9 cents for 1974 in Los Angeles.

Oil Price – Can be doubled.

Parking – Has an average cost of 2 cents/mile in Los Angeles, not including commutation parking costs which are discussed below.

Other Operating Costs – Were kept in the same proportion but adjusted for inflation between 1972 and 1974.

Tables 13-15 summarize the Baltimore and Los Angeles examples and contrast the present average operating costs for a typical Los Angeles commuter (No. 1) with a hypothetical commuter who switches to rapid transit (No. 2). The critical assumptions are:

1. An average trip to work is 20 miles round trip.

2. The work trip is made 240 days a year.

3. The cost of gasoline will average 50.9 cents/gallon for 1974.

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*U.S. Federal Highway Administration, Office of Highway Planning, Highway Statistics Division, April 1972.

TABLE 12

ESTIMATED COST OF OPERATING A COMPACT SIZE 1972 MODEL AUTOMOBILE*

Item	First Year (14,500 miles) Total Cost	First Year Cost per Mile	Second Year (13,000 miles) Total Cost	Second Year Cost per Mile	Third Year (11,500 miles) Total Cost	Third Year Cost per Mile	Fourth Year (10,000 miles) Total Cost	Fourth Year Cost per Mile	Fifth Year (9,900 miles) Total Cost	Fifth Year Cost per Mile
Costs Excluding Taxes:										
Depreciation	$ 674.00	$ 4.65	$ 519.00	$ 3.99	$ 394.00	$ 3.42	$ 305.00	$ 3.05	$ 243.00	$ 2.46
Repairs and Maintenance	79.41	.55	107.14	.83	170.61	1.48	218.90	2.19	240.27	2.43
Replacement Tires	15.30	.11	13.71	.11	12.13	.11	34.27	.34	33.93	.34
Accessories	3.21	.02	3.08	.02	2.96	.03	2.83	.03	2.82	.03
Gasoline	244.25	1.68	218.97	1.69	193.68	1.69	168.39	1.68	166.78	1.68
Oil	10.50	.07	10.50	.08	11.25	.10	11.25	.11	12.75	.13
Insurance	155.00	1.07	147.00	1.13	147.00	1.28	140.00	1.40	140.00	1.41
Garaging, Parking, Tolls, etc.	208.36	1.44	199.22	1.53	190.08	1.65	180.94	1.81	180.33	1.82
Total	$1,390.03	$ 9.59	$1,218.62	$ 9.38	$1,121.71	$ 9.76	$1,061.58	$10.61	$1,019.88	$10.30
Taxes and Fees:										
State:										
Gasoline	$ 63.56	$ .44	$ 56.98	$ .44	$ 50.40	$ .44	$ 43.82	$ .44	$ 43.40	$ .44
Registration	20.00	.14	20.00	.15	20.00	.17	20.00	.20	20.00	.20
Titling	109.86	.75	–	–	–	–	–	–	–	–
Subtotal	$ 193.42	$ 1.33	$ 76.98	$ .59	$ 70.40	$ .61	$ 63.82	$ .64	$ 63.40	$ .64
Federal:										
Gasoline	$ 36.32	$ .25	$ 32.56	$ .25	$ 28.80	$ .25	$ 25.04	$ .25	$ 24.80	$ .25
Oil	.21	–	.21	–	.22	–	.22	–	.26	–
Tires	1.17	.01	1.05	.01	.92	.01	2.61	.03	2.59	.03
Subtotal	$ 37.70	$ .26	$ 33.82	$ .26	$ 29.94	$ .26	$ 27.87	$ .28	$ 27.65	$ .28
Total Taxes	231.12	1.59	110.80	.85	100.34	.87	91.69	.92	91.05	.92
Total of All Costs	$1,621.15	$11.18	$1,329.42	$10.23	$1,222.05	$10.63	$1,153.27	$11.53	$1,110.93	$11.22

Item	Sixth Year (9,900 miles) Total Cost	Sixth Year Cost per Mile	Seventh Year (9,500 miles) Total Cost	Seventh Year Cost per Mile	Eighth Year (8,500 miles) Total Cost	Eighth Year Cost per mile	Ninth Year (7,500 miles) Total Cost	Ninth Year Cost per Mile	Tenth Year (5,700 miles) Total Cost	Tenth Year Cost per Mile	Totals and Averages for Ten Years (100,000 miles) Total Cost	Totals and Averages for Ten Years Cost per Mile
Costs Excluding Taxes:												
Depreciation	$ 194.00	$ 1.96	$ 152.00	$ 1.60	$ 103.00	$ 1.21	$ 73.00	$ .97	$ 39.00	$ .68	$ 2,696.00	$ 2.70
Repairs and Maintenance	268.81	2.72	412.04	4.34	177.27	2.09	78.95	1.05	31.10	.55	1,784.50	1.79
Replacement Tires	38.45	.39	36.89	.39	61.53	.72	54.29	.73	41.27	.72	341.77	.34
Accessories	8.57	.09	8.30	.09	7.65	.09	6.97	.09	5.79	.10	52.18	.05
Gasoline	166.78	1.68	160.06	1.69	143.11	1.69	126.43	1.69	96.03	1.68	1,684.48	1.68
Oil	12.75	.13	12.75	.13	12.75	.15	12.00	.16	6.75	.12	113.25	.11
Insurance	114.00	1.15	114.00	1.20	114.00	1.34	114.00	1.52	114.00	2.00	1,299.00	1.30
Garaging, Parking, Tolls, etc.	180.33	1.82	177.89	1.87	171.80	2.02	165.71	2.21	154.74	2.72	1,809.40	1.81
Total	$ 983.69	$ 9.94	$1,073.93	$11.31	$ 791.11	$ 9.31	$ 631.35	$ 8.42	$ 488.68	$ 8.57	$ 9,780.58	$ 9.78
Taxes and Fees:												
State:												
Gasoline	$ 43.40	$ .44	$ 41.65	$ .44	$ 37.24	$ .44	$ 32.90	$ .44	$ 24.99	$ .44	$ 438.34	$ .44
Registration	20.00	.20	20.00	.21	20.00	.23	20.00	.26	20.00	.35	200.00	.20
Titling	–	–	–	–	–	–	–	–	–	–	109.86	.11
Subtotal	$ 63.40	$ .64	$ 61.65	$ .65	$ 57.24	$ .67	$ 52.90	$ .70	$ 44.99	$ .79	$ 748.20	$ .75
Federal:												
Gasoline	$ 24.80	$ .25	$ 23.80	$ .25	$ 21.28	$ .25	$ 18.80	$ .25	$ 14.28	$ .25	$ 250.48	$ .25
Oil	.26	–	.26	–	.26	–	.24	–	.13	–	2.27	–
Tires	2.93	.03	2.81	.03	4.69	.06	4.15	.06	3.15	.06	26.07	.03
Subtotal	$ 27.99	$ .28	$ 26.87	$ .28	$ 26.23	$ .31	$ 23.19	$ .31	$ 17.56	$ .31	$ 278.82	$ .28
Total Taxes	91.39	.92	88.52	.93	83.47	.98	76.09	1.01	62.55	1.10	1,027.02	1.03
Total of All Costs	$1,075.08	$10.86	$1,162.45	$12.24	$ 874.58	$10.29	$ 707.44	$ 9.43	$ 551.23	$ 9.67	$10,807.60	$10.81

*This estimate covers the total costs of a medium priced, compact size, 2-door sedan, purchased for $2,696, operated 100,000 miles over a 10-year period then scrapped. Baltimore area prices, considered to be in the middle range, were used.

Note: Where costs per mile were computed to be less than 1/20 cent, a dash (–) appears in the column.

Source: U.S. Department of Transportation, op. cit.

TABLE 13

PASSENGER CAR OPERATING COST SUMMARY FOR BALTIMORE VERSUS LOS ANGELES (ADJUSTED) (ASSUMES COMPACT – 5 YEARS OLD) (dollars)

Item	Baltimore (1972)	Los Angeles (1974)	
		No. 1	No. 2
Fixed Costs			
Depreciation	$ 243.00	$ 243.00	$243.00
Insurance	140.00	270.00	270.00
Registration	20.00	24.00	24.00
Titling	–	2.20	2.20
	$ 403.00	$ 539.20	$539.20
Variable Costs	@ 9,900 mi.	@ 9,900 mi.	@ 5,100 mi.
Repairs and Maintenance	$ 240.27	$ 264.30	$136.17
Tires	36.75	40.43	20.40
Accessories	2.82	3.11	1.60
Gasoline (including taxes)	234.98	315.00	162.24
Oil (including taxes)	13.01	26.00	13.41
Parking, Tolls	180.33	198.00*	102.00
Subtotal	$ 708.16	$ 846.84	$435.82
Grand Total	$1,110.93	$1,386.04	$975.02

*No commutation parking; see Table 16.

Source: Data for Baltimore, U.S. Department of Transportation, op. cit.

TABLE 14

CASE 1 – POTENTIAL ANNUAL SAVINGS
ASSUMING NO COMMUTE PARKING COST AT PRESENT
(dollars)

Annual Vehicle Miles Before Rapid Transit (000s)	Annual Vehicle Miles After Conversion to Rapid Transit (000s)								
	4.0	5.1	6.0	7.0	8.0	9.9	12.0	14.0	16.0
20	$1,376	$1,284	$1,204	$1,118	$1,032	$873	$688	$516	$344
18	1,204	1,112	1,032	946	860	701	516	344	172
16	1,032	940	860	744	688	529	344	172	
14	860	768	688	602	516	357	172		
12	688	596	516	430	344	258			
11	602	510	430	344	258	99			
9	430	338	258	172	86				
8	344	252	172	86					
7	258	166	86						
6	172	80							

TABLE 15

CASE 2 – POTENTIAL ANNUAL SAVINGS
ASSUMING $2 DAILY COMMUTE PARKING
(dollars)

Annual Vehicle Miles Before Rapid Transit (000s)	Annual Vehicle Miles After Conversion to Rapid Transit (000s)								
	4.0	5.1	6.0	7.0	8.0	9.9	12.0	14.0	16.0
20	$1,856	$1,764	$1,684	$1,598	$1,512	$1,353	$1,168	$996	$824
18	1,684	1,592	1,512	1,426	1,340	1,181	996	824	652
16	1,512	1,420	1,340	1,254	1,168	1,009	824	652	
14	1,340	1,248	1,168	1,082	996	837	652		
12	1,168	1,076	996	910	824	665			
11	1,082	990	910	824	738	579			
9	910	918	738	652	566				
8	824	732	652	566					
7	738	646	566						
6	652	560							

Given these assumptions, if the commuter retains the second car for personal use, all his/her fixed costs will remain the same. His variable costs will be reduced by some $411 a year if all his/her commutations are diverted to rapid transit and if he is not paying any commutation parking.

4. Commutation Parking Costs

Downtown parking in Los Angeles can cost anywhere from $1.75-4 for an eight-hour period. These costs have not been reflected in Table 12. Because they can play such an important part in the total operating cost of an automobile, commutation parking costs have been separated out for further impact analysis under various mileage "scenarios." ("Commutation" parking costs are above and beyond the normal average cost of $0.02 a mile in Los Angeles which is reflected in the variable costs.)

Table 16 and Figure 7 summarize the results at various levels of cost. Using the same assumptions in Table 12, if a commuter is currently traveling 9900 miles a year, and is paying $3 a day for downtown parking, his total annual costs are $2,100. If he converts to rapid transit and reduces his annual mileage to 5100 miles, and also eliminates the $3/day, his annual costs will be $975 or a savings of $1,131. At a $2/day parking cost, the annual savings would be $891.

Figure 7 can be used to compute potential savings at various mileage reduction levels and parking costs levels.

5. Automobile Costs versus Total Family Budget

Another way of viewing the cost of operating an automobile is in the context of the total family budget. In 1972, the average family income for households owning passenger cars in Los Angeles was estimated to be $12,230. The U.S. Bureau of Labor Statistics would distribute this income as follows:

Item	Percent of Income
Food	22.3%
Housing	24.8
Household – Furn. & Oper.	5.1
Automobile	9.0
Clothing	8.6
Other	30.2
	100.0%

TABLE 16

TYPICAL ANNUAL COSTS FOR OPERATING A COMPACT SIZE AUTOMOBILE
IN LOS ANGELES COUNTY DURING 1974

Costs	Annual Vehicle Miles								
	4,000	5,100	6,000	8,000	9,900	12,000	14,000	16,000	18,000
Total Fixed Costs	$ 539.20	$ 539.20	$ 539.20	$ 539.20	$ 539.20	$ 539.20	$ 539.20	$ 539.20	$ 539.20
Total Variable Costs (excluding commute parking)	344.00	435.82	516.00	688.00	846.84	1,032.00	1,204.00	1,376.00	1,548.00
Case I: Total Costs (excluding commute parking)	883.20	975.02	1,055.20	1,227.20	1,386.04	1,571.20	1,743.20	1,915.20	2,087.20
Case II: Total Additional Costs Including Commute Parking @									
$1/day	1,123.20	1,215.02	1,295.20	1,467.20	1,626.00	1,811.20	1,983.20	2,155.20	2,327.20
2/day	1,363.20	1,455.02	1,535.20	1,707.20	1,866.00	2,051.20	2,223.20	2,395.20	2,567.20
3/day	1,603.20	1,695.02	1,775.20	1,947.20	2,106.00	2,291.20	2,463.20	2,635.20	2,807.20
4/day	1,843.20	1,935.02	2,015.20	2,187.20	2,346.00	2,531.20	2,703.20	2,875.20	3,047.20

Notes: Automobile Description – All costs are based on a 1972 model two-door sedan, equipped with a six-cylinder engine, automatic transmission, power steering, and radio.

Fixed Costs – Fixed costs are calculated as follows:

a. Depreciation – Original cost of the vehicle $2,696 depreciated over a 10-year life and then scrapped. Annual depreciation at $243 a year.

b. Insurance: Liability, $100,000/300,000; Property Damage, $10,000; Medical Payment, $1,000 (uninsured motorist); Annual Insurance Premium, estimated to be $270.

c. Registration and Title Certificate and Operator's License, estimated to be $26 per year.

Total fixed cost – $539.

NOTE: A conservative figure was used for a total fixed costs. A significant number of motorists will carry fire and theft (comprehensive) insurance plus collision which would add another $200 to the insurance bill. Depreciation may also be considerably higher in that the average age of an automobile in Southern California is less than the national average and probably less than 10 years.

Variable Costs

a. Repairs and Maintenance – Includes routine maintenance such as lubrication, repacking wheel bearings, flushing cooling system, aiming headlights, replacement of minor parts such as spark plugs, fan belts, radiator hoses, distributer cap, fuel filter, and pollution control filters; minor repairs such as brake jobs, water pump, carburetor overhaul; and major repairs such as complete valve jobs.

b. Tires – Purchase of 11 new regular tires during the life of the car.

c. Accessories – A conservative $2-8 was spent on purchase of floor mats, car washes, etc.

d. Gasoline – A consumption rate of 15.97 miles per gallon was used and an average retail price of 50.9 cents for regular gasoline was assumed.

e. Oil – Consumption was at the rate of one gallon of oil per 166 gallons of gasoline.

Parking – In addition to the cost of parking downtown, the average automobile owner in Los Angeles County will spend on the order of 2 cents/mile annually for parking at restaurants, sporting events, and local shopping centers.

Source: U.S. Department of Transportation report, "Cost of Operating an Automobile," op. cit.

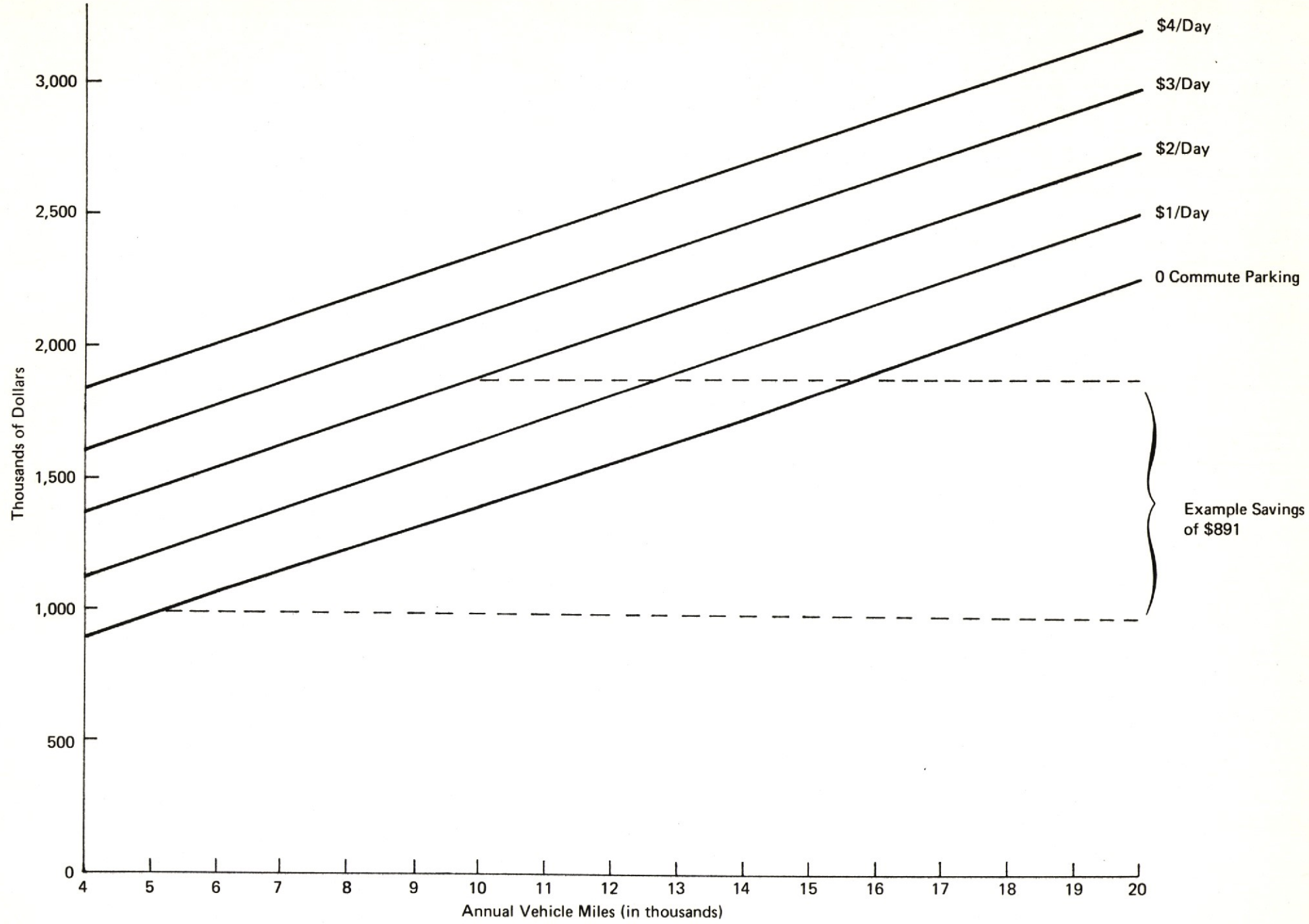

FIGURE 7 VEHICLE OPERATING COSTS VERSUS MILEAGE – UNDER VARIOUS PARKING ASSUMPTIONS

The cost estimates given in Tables 12 and 16 are considerably higher than the $1,100 impled by the above 9% figure. In Los Angeles, a fair statement would be that a household with two automobiles, that is, an average household in terms of income, is probably spending twice as much a year on its cars as on its members' clothing.

The greatest impact of rapid transit will be for that family that currently has one car and may be thinking of buying a second. If instead the family can use rapid transit, it is avoiding at least a $1,000 a year cost.

F. IMPACT OF THE PROPOSED RAPID TRANSIT SYSTEM ON GROWTH AND DISTRIBUTION OF GROWTH WITHIN LOS ANGELES COUNTY AND THE REGION

1. Introduction

The superimposition of a mass rapid transit system on the Los Angeles urbanized area can have a number of effects on overall growth and on redistribution of activities and growth within the region. Since the proposed SCRTD system will cover primarily the urbanized area of the county, excluding the north San Fernando and north Los Angeles County areas, the focus of this analysis will be on effects on economic and demographic locations and relocations within this urbanized area. To the extent possible, indications will be given in terms of the impact on currently undeveloped or relatively undeveloped areas and the possible development "scenarios" that will result.

The basis for planning of the proposed SCRTD system has been forecasts of distribution of employment and population on a small statistical area basis, the translation of these forecasts into trip generation to and from these statistical areas, allocation of these trips generated from one statistical area to all other zones based on attraction factors, and, finally, an estimate of the modal split between transit and auto based on comparative operating economics and travel time between transit and the auto modes.

However, in transportation planning it is well recognized that the superposition of a transit system on an urban area will result in second- and third-order effects; as travel time, access, and relative costs change, so will the distribution of economic activity and population. Thus, the forecasts of employment and population on a small statistical area used as a basis for the initial round of transportation planning will more than likely change as a result of the effects of the development of the transit system.

Possible second- and third-order effects include the following:

- An overall change in the growth rate of population for Los Angeles County.
- An overall change in the employment growth predicted for the county.
- Changes in the location of added growth for both population and employment.
- Redistribution of existing activities.
- Increased "recycling" of older urbanized areas, thereby reducing growth in outlying, less developed areas.

- Changes in land values in the urbanized areas depending on the location of particular parcels to the corridors of the mass transit system, reducing land values in some areas and increasing them in others.

- Changes in land uses throughout the urbanized area and changes in the expected types of land use in developing peripheral areas.

Examination of the proposed SCRTD system, including the exclusive bus-way, priority bus on freeway service, and the fixed guideway service – i.e., the balanced system proposed – suggests that the system will cover and provide service to the mature urbanized areas of Los Angeles County. Thus, except for collector nodes at the extremes of the system, and whatever link might be proposed to the Orange County transit system, this transportation network focuses on providing service to the existing population and in the main will not be a development-type transportation network. This would contrast, for example, with some of the links in the Bay Area Rapid Transit system (BART) which extends out into either relatively or totally undeveloped areas, thus providing access to heretofore remote areas. The SCRTD system will probably provide little of this type of developmental transportation, but rather will reflect in general a better access system for the urbanized area.

This has major bearing on the possible influence of the transit system on both overall growth changes and redistribution of economic activity. Since the system is overlaid on a mature urbanized area, significant changes such as recycling of older areas, increase in population densities, and other factors will be necessary for the population base it is serving to increase dramatically. The exceptions to this, again, are the collector nodes at the periphery which will provide increased access from undeveloped areas to the central areas and its employment opportunities.

2. Population Projections

To place a transportation system in perspective, it is important to examine the anticipated growth for the region, for Los Angeles County, and for subareas within the county to determine the future distribution of population and economic activity. Currently, as is true of other areas in California, population and employment forecasts for the Southern California area – or, a more restricted definition, the six-county SCAG area (Los Angeles, Orange, San Bernardino, Riverside, Ventura, and Imperial counties) – are being significantly revised. Bullish forecasts of the late 1960s and early 1970s have been totally discounted based on current conditions assuming reductions in in-migration rates and in the birth rate.

As recently as 1972 estimates for the six-county region were for a 1990 population of 14 million compared with a 1970 population of just over 10 million (Table 17). This represented a 40% increase during the 20-year period. In recent months total revisions have occurred, with the resultant 1990 forecast for the six-county area of about 12.7 million, or an increase of only 27% in the 20-year period to 1990.

TABLE 17

COMPARISON OF POPULATION FORECASTS FOR THE SCAG* REGION
(thousands)

County	Actual 1970	1990 D-150 Forecast Adopted January 1972	County Preferred Forecast January 1974	Difference Between Forecasts
Los Angeles	7,039	8,664	7,701	- 963
Orange	1,420	2,445	2,240	- 205
Riverside	459	726	765	+ 39
San Bernardino	682	1,065	1,065	0
Ventura	378	902	835	- 67
Imperial	74	98	98	0
Total SCAG Region	10,053	13,898	12,705	-1,193

Percent Increase 1970-1990

D-150 – 38.2%
County Preferred – 26.4%

*Southern California Association of Governments.

Source: Southern California Association of Governments Development Guide, Growth Forecast Section, January 10, 1974.

For Los Angeles County the forecast from two years ago has been revised downward to an estimated 7.7 million by 1990 compared to a 1970 level of 7 million. This means only a 10% increase in population in Los Angeles County over this 20-year period. Thus, most of the anticipated regional population growth will occur or is expected to occur outside of Los Angeles County. Of the anticipated growth of about 2.7 million by the year 1990, Orange County is expected to have 31% of the increase, or 821,000; Los Angeles County, 653,000 for a 25% share of total growth; and Ventura and San Bernardino each, additions of some 400,000. While Los Angeles County currently has the greatest population, it will have only the second highest level of absolute growth over the next 20-year period and the lowest percentage increase.

Within Los Angeles County the central urbanized area is expected to have almost 60% of the estimated 700,000 growth in population (Table 18). The rest of the population growth within the county is projected for the North Los Angeles County area. That area will not be served by the proposed system. The service area of the proposed system will therefore grow very modestly under the current preferred population forecast developed by SCAG.

3. Employment Projections

Just as population forecasts for the six-county region have been revised downward, so have employment forecasts. As of 1972 forecasts suggested that employment would grow from 4.2 million in 1970 to almost 5.9 million in 1990. More recent forecasts have identified an employment level in 1990 of some 5.5 million, down just under 400,000 from the 1972 forecast (Table 19).

In 1970 Los Angeles had approximately 3.2 million in employment or 75-76% of the regional total. Under the new forecasts its employment will increase to about 3.7 million in 1990, a growth of just 16%. This compares to an overall regional growth in employment of almost 31%. It is anticipated, based on these forecasts, that both in terms of population and employment, Los Angeles County will receive a lesser share of growth.

Within Los Angeles County a significant share of increased employment is expected to be located in the North County area, with only about 260,000 in the present urbanized area of Los Angeles. Almost 3.1 million of the present 3.2 million in employment are concentrated in this same urbanized area. For 1990, this employment is expected to increase only by 300,000, or less than a 10% growth rate over the 20-year period.

Within this urbanized area examination of smaller statistical areas suggests that employment growth in currently significant employment centers will not be extensive (Table 20). For instance, the most dramatic in terms of modest growth anticipated is the forecast for the Los Angeles central business district (CBD). In 1970 it was estimated that some 338,000 employees were located there. It is projected that by 1990 355,000 will be located there, a net addition of only 17,000 employees or approximately 5% of the existing employment in the CBD. Similar low growth rates occur for most of the major employment centers in the urbanized area. For instance, the Long Beach area is expected to grow by only 13,000 employees between 1970 and 1990, an increase of about 7% over the existing 188,000 in the Long Beach statistical area.

TABLE 18

ANTICIPATED GROWTH OF SELECTED SUBAREAS OF LOS ANGELES COUNTY 1970-1990*

	1970	1990	Growth 1970-1990	Percent Increase 1970-1990
Los Angeles County Total	7,039,000	7,701,000	662,000	26.4%
Subareas				
North Los Angeles and North San Fernando	417,000	679,000	262,000	62.8
Rest of Los Angeles County (primarily SCRTD service area)	6,622,000	7,022,000	400,000	6.0

*Forecast used is the County Preferred, adopted in early 1974.

Source: Southern California Association of Governments Development Guide, Growth Forecast Section, January 10, 1974.

TABLE 19

COMPARISON OF EMPLOYMENT FORECASTS FOR THE SCAG REGION* (thousands)

County	Actual 1970	1990 D-150 Forecast Adopted January 1972	County Preferred Forecast January 1974	Difference Between Forecasts
Los Angeles	3,212	4,019	3,681	-338
Orange	482	888	844	- 44
Riverside	154	247	274	+ 27
San Bernardino	209	351	351	0
Ventura	117	307	284	- 23
Imperial	29	40	40	0
Total SCAG Region	4,204	5,851	5,474	-377

*Employment by place of work.

Source: Southern California Association of Governments Development Guide, Growth Forecast Section, January 10, 1974.

TABLE 20

ANTICIPATED EMPLOYMENT GROWTH OF SELECTED SUBAREAS OF LOS ANGELES COUNTY
1970-1990

	1970	1990	Growth 1970-1990	Percent Increase 1970-1990
Los Angeles County Total	3,219,500	3,681,168	461,668	14.3%
Selected Subareas				
North Los Angeles County and North San Fernando	107,850	239,901	132,051	122.4
Los Angeles CBD	337,900	354,872	16,972	5.0
Long Beach Area	188,000	200,850	12,850	6.8
West Central Los Angeles	448,200	493,176	44,976	10.0
Burbank	123,900	131,914	8,014	6.5
Rest of Los Angeles County	2,013,650	2,260,455	246,805	12.2

Source: Arthur D. Little, Inc., estimates based on Southern California Association of Governments Development Guide.

As indicated earlier, however, the proposed transit system could in fact make significant changes in the estimates of population and employment growth within these statistical areas.

Major effects could be anticipated in the major concentrations of employment in the area, in particular the Los Angeles CBD. Currently the central Los Angeles area has almost 50% of the total employment in finance, insurance, real estate, and services in the Los Angeles and Orange County areas. These sectors of the economy, those fastest growing in any mature metropolitan economy, require many and extensive related services and face-to-face communications for economic viability. Thus, central concentrations of these types of economic activity are expected to continue in the future. With the improved access to the central area provided by the proposed transit system, it can be anticipated that these particular sectors of the economy of Los Angeles – finance, insurance, real estate, and related professional and business services – will continue to concentrate in major centers of activity. Thus, a growth rate higher than the anticipated rate of only 5% in the CBD is likely.

4. Other Economic Forecasts

Other base economic activities such as manufacturing and warehousing are not as dependent on central locations for viability. Rather, they typically require large expanses of land, and while they need access to labor markets with appropriate skills, can still locate on peripheral areas of urban development.

Population-serving activities such as retailing and some portions of the service economy will continue their location in proximity to population concentrations. To the extent that major retailing centers will be within corridors of the transit system, their growth will probably occur at the expense of centers more remote from the corridors.

There is likely to be increased retail activity in the CBD resulting from both the place of employment in these areas and the improved access that will be provided by the transit system. Specialty goods and other higher order of retailing will be located in such centers as the Los Angeles CBD and along the Wilshire corridor. To some extent, this may draw off higher order retailing activity from some regional shopping centers. It is difficult to anticipate exactly the magnitude of this shift.

In terms of residential location and redistribution, it can be anticipated that conversion to higher densities will occur near the corridors of the transit system, resulting in possible population growth in these areas in excess of that anticipated by the first round of population forecasts. This growth may be at the expense of residential development in outlying areas.

From a regional standpoint, it appears that the creation and development of a rapid transit system will not reduce overall trips or trip activity measured in passenger-miles. This basically line-haul transit system will improve access between centers of development; and while it is anticipated that local servicing areas around existing centers will be improved, the dramatic increase in access between and among centers will probably dictate that no dramatic decreases will occur in overall regional trips.

In conclusion, it appears that the superposition of the transit system on the urbanized area of Los Angeles County will result in increased employment over and above the forecast levels in the central area, especially in the finance, insurance, real estate, and service components of the economy. Population growth anticipated for Los Angeles County will probably remain about the same. However, redistribution within the county towards higher density in the urbanized area will probably occur; overall trip lengths will probably not decrease; and overall trips themselves will not decrease in number as a result of the transit system.

IV. AN ANALYSIS OF COST-BENEFIT AS A CRITERION FOR ASSESSING THE INVESTMENT IN RAPID TRANSIT

A. INTRODUCTION

It has become common in the past few years to attempt to perform cost-benefit or cost-effectiveness analyses for major governmental programs, projects, and investments. To date, the results of those analyses which have been performed have been unsatisfactory, both from a technical point of view and in terms of meaningful advice either to policy makers or to the general public. The Secretary of the U.S. Department of Transportation has given an indication to the Southern California Rapid Transit District that he desires to see such an analysis performed for the district's proposed rapid transit program before committing federal grants in support of that program. The purpose of this chapter is to describe briefly the nature of and expected results from cost-benefit analysis as it is generally applied and the reasons why such an analysis is unlikely to yield useful results for consumption either by policy makers or the public. Suggestions will also be made for types of analysis which would be more productive.

B. THE COST-BENEFIT ANALYSIS FRAMEWORK

Cost-benefit analysis is conceptually quite simple: its purpose is to measure all of the benefits and all of the costs associated with a particular program or project and to determine on the basis of such measurement whether or not the benefits would exceed the costs. So stated, there is little doubt that such an approach to the evaluation of programs, policies, and projects is desirable. Since virtually all decisions made by public policy makers imply a sense of what the benefits and the costs of a particular decision will be, it would be useful if those benefits and costs would be made more precise.

Despite the rather simple conceptual foundation and the apparent desirability of performing cost-benefit analysis, the results of such analyses cast considerable doubt upon the reliability of results which can be obtained. There are also serious doubts as to the applicability of a quantitative approach where the expected benefits and costs are either intangible or susceptible to varying evaluations according to the individual's perceptions as to what are costs and what are benefits. The difficulties and defects of cost-benefit analysis can be grouped, somewhat artificially but usefully, into technical problems and policy problems. Although the two classes of problems are related, it is useful to distinguish between the technical difficulties associated with carrying out cost-benefit analysis and the policy problems inherently associated with a method of analysis which attempts to quantify and encompass different kinds of impacts.

1. Technical Problems Associated with Cost-Benefit Analysis

A host of technical difficulties confronts the analyst in attempting to perform a cost-benefit study for a rapid transit program or any other complex program having potentially widespread benefits and significant implications for the welfare of citizens within an area. These problems may be grouped into: problems of definition, problems of measurement, problems of valuation, problems of tracing, and problems of uncertainty.

a. Problems of Definition

Perhaps the most neglected problem confronting cost-benefit analysis is the problem of defining what is a benefit and what is a cost. Although not recognized as a serious problem in early cost-benefit analysis, it is becoming increasingly evident that the mere classification of impacts into costs and benefits implies value judgments which affect the results of the analysis and its acceptability. In theory this problem can be avoided if the analysis focuses on measuring the changes in well-being for every individual affected by a proposed project (assuming that problems of valuation can be overcome). However, as a practical matter it has proved impossible either to identify every individual affected by a project, to identify the nature of the impacts on him, to identify his preferences as a means of classifying the change in his well-being, or to devise an acceptable means for aggregating individuals into groups in order to make conclusions about overall social benefits or costs.

Since this is the case, a practical approach requires assumptions as to the perceptions of a relevant population regarding what are benefits and what are costs. While in some cases these assumptions may have general validity, in others the assumptions predetermine the nature of the conclusions. For instance, almost everyone would agree that a reduction in loss of life is a benefit. On more controversial subjects involved in rapid transit planning there is far less agreement. For instance, what assumption is to be made about the effects of rapid transit on land use patterns? If rapid transit increases densities of development in one area, is that a benefit or a cost? If rapid transit expands the total area of settlement within a region by making it possible for households to locate farther from their place of work or have a wider choice of residential and job locations, is that a benefit or a cost? More obviously, if a rapid transit program is expected to increase economic growth and population growth within a region, is that a benefit or a cost, and from whose point of view?

In all of the above cases, defining an expected impact as a benefit or a cost requires an assumption regarding the perceptions and desires of a relevant population, which in turn requires a definition of the relevant population. For those in Los Angeles County or the Southern California Association of Governments (SCAG) region who are opposed to any additional growth in the area or in the region, any program which may have such an impact produces a cost equivalent to the growth induced. For those who desire growth, such an impact would be a benefit of the project. And, if one varies the population deemed to be relevant, the answers may change. Residents of the Los Angeles area may decide that growth itself should be classified as a cost because of a perception that growth itself produces more costs than benefits; on the other hand, residents of the region, of Santa Barbara County, of the state, or of the United States may feel that minimization of

growth in that area will cause adverse effects in other areas and therefore consider growth within the area to be beneficial. Since federal, state, and local dollars and decisions are usually involved in a transportation program, the attitudes of populations outside the area directly affected cannot be ignored as irrelevant and the question of benefit definition is further clouded.

This is also true on the cost side. Virtually all cost-benefit studies performed for local or regional projects ignore project costs funded from nonlocal sources, such as federal grants. The rationale for doing so is that the relevant decision population is local and that these costs do not fall on the decision population except very indirectly through federal taxation. A more important reason for failing to include such costs is the practical inability to determine the benefits and costs of a local program for the entire country. Therefore, federal decisions as to available financing must be accepted as representative of a decision already made by policy makers at the federal level as to the benefit-cost ratio for a certain type of investment. Given that this assumption is required, the rationale for performing a cost-benefit analysis for a local project in order to justify the federal grant is completely undercut.

In addition, local decision makers simply do not have the assigned responsibility or ability to make judgments as to the benefits to be obtained for the nation as a whole.

The results of a benefit-cost analysis must necessarily be fairly artificial for purposes of consumption by federal officials if performed to produce results in the least bit useful for local officials. This technical problem thus translates into a policy difficulty inherent in cost-benefit analysis to be discussed later, involving the question of the respective roles of government in making decisions regarding allocation of resources.

b. Problems of Measurement

Measuring benefits and costs and translating them into dollar values has constantly plagued cost-benefit analysis. Generally, it is assumed that costs are fairly well defined and that benefits present the measurement problem. Although measurement of benefits has certainly been the major problem, in actuality the same problem exists for costs, if all relevant costs are properly included. They rarely are, for the same reasons that not all benefits are included and measured: namely, that they can barely be identified, much less measured.

The first step in measurement is identification of the benefit or cost, on the assumption that agreement has been reached on what is a benefit and what is a cost. Identifying benefits implicitly requires identifying beneficiaries. Thus, conventional cost-benefit analysis for transit programs (or highway programs) typically classifies benefits into traveler or user benefits and secondary benefits, such as benefits to the unemployed, to businesses, to property owners. It is more rare to see an attempt to identify the nonbeneficiaries, or the losers. For instance, a transit improvement program may reasonably be expected to increase transit patronage and thereby reduce potential automobile sales. As a result, on the cost side, one should look at the impacts on automobile dealers and salesmen. This is never done, for the simple reason that those who would lose the sales cannot really be identified and even if

they could it would be virtually impossible to identify the costs associated with such losses and aggregate them in any meaningful way. Most of them are potential or opportunity costs, rather than actual costs.

Similarly, impacts on those who may be benefited are difficult, if not impossible, to identify and measure. Some who live near a proposed transit station and own property may be expected to realize enhanced property values. On the other hand, those who live in the same area but do not own property may be forced out by increasing rents. Measuring these impacts can be considered infeasible for any "system" because of uncertainties regarding the overall effect of the system on property value shifts and impacts on any particular individual or groups of individuals.

Even more conventional problems addressed by cost-benefit studies are not capable of acceptable resolutions. For those who use it, a rapid transit system will offer time-savings in making trips which are now made by another mode or will make it possible to reach more distant destinations in the same amount of time. Generally cost-benefit analysis assumes that the user population will take advantage of the time-savings and then proceeds to place a value on the time-savings and cumulate the values for the entire user population affected. In the more sophisticated analyses, the nonuser population which might benefit from shifts from currently congested modes is also identified. However, the potential time-savings can only be accurately measured if it is assumed that the user will continue to make the same trip in order to shorten his travel time. He may well make a different choice, such as to travel farther. If he does so, the time-savings measurement becomes irrelevant and there is another impact to measure, the benefit to him of being able to travel farther.

Even more challenging are the attempts to measure nonquantifiable aspects of convenience associated with transit: the ability to use the time on the train or bus for reading, for sightseeing, for uninterrupted conversation, for completing a task; or the comfort which may be offered by the ride; or fear associated with particular modes, such as subways; the degree to which trips can be made without prior planning because of the presence or absence of a reliable mode of travel; or the number of accidents avoided or lives saved.

More importantly, all transportation systems, and particular transit, have widespread effects on the qualitative aspects of life in an urban area and on the service environment. Since transportation is an essential service, there is no conceivable situation in which it would be completely done without. Each system and each component of it have widely ranging impacts on economic productivity of an entire region, individual productivity, access to opportunities for education, cultural enrichment, and recreation, and on the shape of the urban environment. While these impacts can generally be identified and classified, and while theory and experience offer a basis for estimating the probable nature or direction of the impacts of a particular program, neither theory nor methodology is available to measure these impacts with any degree of reliability.

Generally, the approach of cost-benefit analysis is to attempt to make aggregate measurements of changes caused by a program or project, with some changes labeled as benefits and some labeled as costs. One method is to take various impact components, such as effects on time-savings by transit users, savings in parking construction costs by businesses, and reduced unemployment compensation costs, and to aggregate all of these "benefits" to arrive at an aggregate effect of the project. The implicit assumption in this procedure is that there is a base from which impacts are identified and measurements are based, and the base is almost always the status quo.

Sometimes, and this is true of the evaluative procedure followed by SCRTD consultants, an attempt is made to identify effects not in terms of the status quo but in terms of the alternative situation likely to exist at a future time produced by some other program or set of programs assumed to be followed. While this increases the sophistication of the analysis, it does not change the fact that effects are identified and must be measured against some situation assumed to exist. This approach is usually called the "with-without" approach. It attempts to isolate and measure impacts produced by a project by identifying probable conditions without the project and with the project. The difficulty with this approach, also commonly used in environmental impact assessment, is that it is very difficult to say what conditions might exist, particularly in the future, or what alternatives might exist; or it relegates the analyst to the use of the status quo as the only known. It is particularly difficult, even in after-the-fact analysis, to determine the degree to which certain impacts, such as a downtown office building boom, resulted from a transit program or from other factors and the degree to which they can be accounted for by one or another cause. At present, this type of analysis is being performed on the Bay Area Rapid Transit System and it is apparently almost as difficult to measure the impacts of a transit program after it has gone into operation as it is to predict what those impacts will be.

Predictive impact analysis and cost-benefit analysis are obviously even more difficult since, if measurement of known occurrence is difficult, measurement of unknown effects is all the more so.

c. Problems of Valuation

Closely related to problems of definition and measurement in cost-benefit analysis is the problem of valuation. The cost-benefit framework itself calls for a common denominator of value to be attached to every effect which can be identified and measured. The intended result is to be able to compare all effects and to arrive at a net answer or a measurable ratio, expressed in dollars. The aim is comparable to quantification of all effects.

It is obvious to all analysts today that, however worthwhile the effort to improve upon methods of measurement and valuation, we can expect little progress in reducing different kinds of benefits and costs to quantified values. Aesthetic, social, and many environmental impacts cannot successfully be converted into dollar amounts because there are no markets which establish their dollar value to either an individual or to a community. As a result all analyses produce results only for some of the benefits and some of the costs of a project,

leaving the remainder to be judged qualitatively. Since the nonquantifiable benefits may be the most significant and are almost always the most controversial, this means that the analysis cannot deal adequately with the *central* issues. Due to the greater value typically attached to quantification, the analysis also has the misleading effect of attaching greater importance to those benefits and those costs which can be quantified. The effect is that no conclusion can be drawn about *net* benefits or *net* costs. This is particularly the case in analysis of transportation programs because of the inability to measure adequately the overall effects of transportation programs on other areas of concern, such as land use patterns, location of economic activities, social relationships, and public services, and the required focus on transportation as a uniquely identified good without regard to its function relative to other activities and services.

Although ingenious methods have been devised to attach dollar values to particular effects, such as travel time-savings, the values which are chosen are of necessity averages and it must be assumed that every individual affected attaches the same value to the variable. In practice, it is well known that this is not the case. Clearly, some individuals would value their time very highly and travel time-savings effected by transit would be worth a great deal. They would, we assume, be willing to pay a certain amount to save a certain amount of time in travel, and the use of air travel by businessmen is some indication of the importance of time to them. On the other hand, time is worth less to others and its value to anyone will depend on the particular activity in which he is engaged at any particular time. Even if it were possible to disaggregate effects on different people and to attach different values to something like time based on incomes or wage levels, this would require the implicit value judgment that one person's time is worth more than another person's time. Whether such a judgment should be made by decision makers as a matter of public policy in the choice of a transportation system is dubious, since that judgment expresses a conclusion about the social productivity of different citizens' time or at minimum an acceptance of current patterns of job and income distribution.

Beyond this theoretical level, there are even more serious practical problems of valuation facing cost-benefit analysis. What is generally required, if all benefits and all costs are to be taken into account, are assumptions regarding the benefit-cost ratios involved in other projects, activities, and decisions which will be influenced by the particular transportation decision. For example, a rapid transit system in Los Angeles may be designed and expected to enhance the possibilities for renewal and redevelopment of central city areas which have been abandoned in favor of outlying areas. Assuming that we can predict that such renewal will occur and in particular amounts, the question arises as to how to value such an impact. If one believes that renewal of such areas is itself economically or socially beneficial, then there is a benefit and it must be measured and valued somehow. However, one may not believe that such an impact will be beneficial in terms of the overall metropolitan economy. To resolve the question would in fact require an analysis of the benefits and costs associated with different locational patterns in the entire metropolitan economy and of the impacts of those patterns on the functioning of that economy, a task that is clearly beyond current analytical capabilities. This leads to the tracing problem discussed below.

As another example, assume that it is known that a particular project will increase the number of jobs available and that there will be a net reduction in unemployment. How does one value the reduced unemployment? A common approach is to determine the net savings in welfare or unemployment compensation payments. However, these payments only represent the value which society has determined a man's unproductive time to be worth; they do not represent the value which he attaches to his time or the effects of unemployment on his ability to feed his family and engage in a satisfying life.

In the case of other impacts, such as the disruption of a community caused by freeway or transit construction, causing increased traffic congestion, perhaps the loss of open space, or the creation of a physical and social barrier between different areas, there are no acceptable means to attach a value to the effects.

Normally, in our system of government, the valuation of different actions is performed by voters and their representatives as a political act. The political decision substitutes in collective decision making for the individual market decision to buy or not to buy. To the extent that benefit-cost analysis attempts to arrive at a "technical" assignment and aggregation of values to discrete effects, it bypasses political decision making as the accepted method of arbitrating among competing values.

d. Problems of Tracing

Already mentioned in other contexts is the problem of where to draw the line in cost-benefit analysis. Such analysis takes place in an institutional and economic context which is essentially open-ended. There are no boundaries which provide given limits for the analysis. This is seen in the definitional problems associated with choosing the relevant population for which to identify benefits and costs, and in the problem of valuation where assumptions must be made as to the overall character of expected secondary effects. It is also a problem of measurement since the more indirect an effect, the more difficult it is to measure.

The decision about where to terminate analysis of benefits and costs is essentially arbitrary. Assumptions must be made on the basis of established policy, personal value judgments, institutional constraints, and technical limits on the degree to which analysis can be conducted. Generally, if a proposed rapid transit system is likely to promote successful conclusion of an ongoing or planned urban renewal project, the analyst does not investigate the benefits or costs of the urban renewal project. He simply accepts the project as having some net benefit. This means that he stops tracing through costs and benefits at that point. Similarly, a transit system may save tourists to an area time and money during their vacation. These savings are usually not included because of the difficulty of measuring them. If they were measurable, one might attempt to determine the degree to which those savings would cause a channeling of more money into the purchase of local goods and services and then the extent to which that would increase local employment. Or one might attempt to determine the degree to which such savings would permit that individual to take longer vacations. The effects could be traced indefinitely if adequate knowledge were available. Since it is not, the tracing process must stop at some point.

Of critical concern in the evaluation of projects such as rapid transit is that fact that many of the effects will occur over a long period of time, are likely to be very subtle, and will not be encountered in an analysis of direct effects. They are usually termed secondary effects and they present the greatest measurement and identification problems. However, if the secondary effects are likely to be more important in the end than the direct effects, then the inability to trace the secondary effects is a significant weakness of the analysis and may well produce inaccurate results regarding the costs and benefits of the project. Transportation projects are particularly good examples of the types of projects which may have secondary costs and benefits more significant than the direct effects. On the basis of economic theory, the second-round effects over a long period of time of transportation investments on land use patterns may well be identified in general. Yet they are not easily traced in cost-benefit analysis because of inadequacies of methodology in economic and social analysis. That freeway construction in the Los Angeles area has had substantial effects on patterns of land use and environmental conditions seems undeniable. Whether such effects can even today be measured and valued is questionable.

e. Problems of Uncertainty

A problem common not only to cost-benefit analysis but also to all policy making is uncertainty regarding the future, particularly with respect to those factors which interact with policy decisions in one field to produce certain outcomes. In transportation planning the types of uncertainties which tend to receive the most treatment involve possible technological changes in transportation system developments. Often, however, the concern with premature commitment to a particular system or mode choice on grounds of expected technological advances is translated into nothing more than a fear of action and a commitment to the status quo. Although technological breakthroughs are almost always anticipated, history seems to indicate that, at least in the case of ground transportation, they are few and far between and less can be expected than was once thought. However, to the extent that cost-benefit analysis must make assumptions about a base situation for comparative purposes, uncertainty regarding technological changes presents a serious technical problem. For example, if one assumes that a solution will be found to the polluting qualities of the internal combustion engine, vastly different results may occur in a cost-benefit analysis for transit than if one assumes that no solution will be forthcoming.

Perhaps even more difficult and more pervasive are uncertainties regarding changes in the social, economic, and institutional environments which shape transportation demands and responses to them. In the late 1940s few could have predicted that the primary impetus for construction of a massive, national highway network would have arisen out of a concern for national defense and a "cold war" which shaped decisions to funnel massive amounts of funds into that network. The institutional environment had changed and a particular "actor" in that environment – the federal government – changed the entire scope of transportation system evaluation and ultimately the nature of travel patterns. If rapid transit projects had been evaluated before those decisions in terms of their benefits, the conclusions would certainly not have taken account of the benefits associated with transit or highway contributions to national defense. Yet national defense benefits were implicitly a primary benefit attributed to freeway construction.

Cost-benefit analysis requires predictions to be made about a host of future factors which are unknown: probable work patterns, including staggering of work hours and the four-day or three-day week; attitudes toward time spent in commuting and residential location preferences; levels of employment or unemployment; prices of gasoline and electricity and available supplies; probability of major earthquakes or other natural disasters; and demographic variables. Of particular concern is uncertainty with regard to population and economic growth because of the history of inaccurate predictions. At present, projections of future population growth are based on very recent, and atypical, trends in birth rates in the United States. Not more than two years ago, population projections indicated potential increases in the SCAG region's population of almost four million people by 1990. Today, the estimate is 2.7 million. In fact, there is little certainty as to the increases which are likely to occur over the next 20 years. On the other hand, decisions must be made about transit systems or parts of them to be operational from 5-15 years from now. Estimating the benefits of a project requires assumptions regarding the changes to occur in the economy, in population, and in various institutional factors affecting the impact of the project on travel demand satisfaction and on land use patterns, with little certainty as to the nature of the environment within which the transit system will be functioning in the future.

2. Policy Problems Associated with Cost-Benefit Analysis

The various technical difficulties explored above suggest serious policy implications associated with the concept of cost-benefit analysis as it can actually be applied. In effect, such an approach assumes that technical methods are available to evaluate complex trade-offs and distributions of costs and benefits among various individuals, groups, and governments. This assumption is implied in the attempt to obtain measurable values in common terms for each effect and to aggregate differing effects on individuals and groups into a net "community" benefit or cost expressed in dollar values. Such an approach raises serious questions regarding its value in assisting those who must make the decision. Some of the additional policy-related problems are discussed below.

a. Failure to Consider Alternatives

Because cost-benefit analysis is so time-consuming and so expensive, the conventional approach is to analyze a particular proposal without regard to other alternatives and to specify *absolute*, rather than *relative*, benefits and costs. Normally, the base used implicitly for purposes of measuring change is the status quo. Sometimes it is an assumed future. Thus, this type of analysis inevitably leads to conclusions regarding the benefits and costs of a particular project without regard to the possible benefits and costs of all other alternative projects or situations and without regard to the opportunity costs or benefits associated with not undertaking the project.

From the point of view of policy making, this is a serious defect in cost-benefit analysis and generally means that such analysis does not contribute anything to knowledge regarding a project's worth if alternatives have already been analyzed in terms of their relative ability

to achieve certain desired effects (benefits) and to minimize undesired effects (costs). This is the case, for instance, where an elaborate and sophisticated planning process has been utilized in arriving at the choice of a rapid transit program, as is the case in Los Angeles. The planning process has itself involved a comparative evaluation of the relative costs and benefits of alternative solutions to a particular problem and alternative means of achieving certain goals. If this process has been conducted conscientiously and expertly, the final choice of a project is a result of an implicit relative cost-benefit analysis which has involved prior analysis of many alternatives. To the extent that conventional cost-benefit analysis is then applied simply to estimate the absolute effects of the project, it contributes far less to understanding of the choices available and their relative desirability than the original analysis which resulted in the choice. Since, indeed, it does not consider alternatives, it is far less illuminating and virtually worthless to the serious decision maker concerned with choosing the best alternative available to meet a need. At its best, it simply indicates the likely effects of his choice without regard to the other alternatives which were or are available. Such an exercise is hardly useful in making decisions though it might be used for certain limited purposes (such as identifying means of recouping special benefits for overall public gains or in taking advantage of expected impacts through other public policy decisions).

b. Bypassing the Citizens' and the Decision Makers' Role in Establishing Values

To the extent that cost-benefit analysis succeeds technically in defining and valuing benefits and costs, it effectively erodes the role of individual voters and their representatives in making their own value judgments as to what is good or bad with respect to a particular project. The analysis is by its nature evaluative since it involves classification of expected effects into benefits and costs and assignment of values to both according to a common measurement system. Thus, it consists essentially in an attempt to package all effects into a final conclusion as to the positive or negative quality of the project. Aspects of cost-benefit analysis involve value judgments by the analyst which may be at odds with value judgments which would be made by all or segments of the particular community or communities for which the project is proposed.

The purpose of such analysis should be to assist citizens and policy makers in assigning their own values to the impacts of a project, thereby setting their own goals and policies as to the desired qualities of their communities. While cost-benefit analysis can attempt to incorporate these values into the analysis by basing the classification of costs and benefits on adopted policies and goals for a community, there will remain substantial disagreements even within the community as to the meaning of a particular goal or policy statement in any particular instance. For example, while there may be general agreement on the desirability of concentrating future growth in Los Angeles in established centers, there is probably not yet agreement on the allocation to each and the degree to which existing land uses should be disrupted in pursuance of that goal. Thus, at the individual level, some residents may favor the general concept of increasing densities at particular locations and yet oppose the same policy if applied where they live. Although these issues must be and are dealt with at the political level, they cannot be dealt with technically in cost-benefit analysis, nor should they.

By its nature, cost-benefit analysis must also use common values for application to different people, despite the fact that different people will have different perceptions regarding the importance of a particular benefit or a particular cost. Reconciliation of these conflicts and differences can only be accomplished in the political arena and not by technical means which assume the absence of such conflicts. There is simply no means by which to determine each individual's benefit or to aggregate those benefits for an entire community. The same may be said as to indirect costs.

c. The Fallacy of the *Net* Benefit and *Net* Cost Approach

Conventional cost-benefit analysis generally arrives at either an estimate of the benefit-to-cost ratio or identification of the net benefits or costs in dollar terms.

In the first case, a ratio is shown in order to avoid the difficult proposition that there is actually an identifiable net dollar effect. In the second this additional leap is made. In actuality, the two are only variations on a similar theme: each proposes to indicate an aggregate relationship between benefits and costs which is expected to have some social or economic significance. If the benefit-cost ratio exceeds 1.1 to 1.0 or if the *net* effect is positive, then it is assumed that the project is desirable.

The effect of this emphasis on aggregation of differential effects is to obscure the probably more significant impacts on discrete individuals and groups. Underlying the approach is an assumption that someone's loss can be valued against someone else's gain and if those who gain, gain more than those who pay, then the project is desirable. This approach is not accepted in either the theory of welfare economics or in democratic political theory. The danger of the approach is that the discrete underlying effects on different groups and individuals may be ignored and thereby exacerbated. This is particularly critical if those who stand to bear a cost are much less well off than those who stand to reap a gain from a particular project, which is a strong possibility in choosing among alternative transportation projects.

Generally, it seems wiser to do the best possible job at estimating impacts and evaluating alternatives and let elected representatives and citizens who have varying interests and will be affected differently indicate how they feel about and value the prospective changes. In this way trade-offs can be made which tend to even out the distribution of gains and losses. The misleading character of conventional cost-benefit analysis is to suggest that there is some mechanism which provides for the transfer of benefits and costs among persons so as to arrive at a net social benefit. This is in fact not the case, except through political bargaining.

d. The Role of the Decision-Making Body and the Central Role of Policy

Comprehensive cost-benefit analysis would deal with the effects of any proposed action and its assigned value on all those who may benefit from it or bear its costs. Thus, as indicated above in the discussion of problems of definition, ideally a cost-benefit analysis of a

rapid transit program in Los Angeles, if a program is to be financed in part by the federal government, should address the question of the costs and benefits of the program to the entire population of the United States. Since this is obviously impractical as a technical matter and useless from the viewpoint of local policy makers, it is never done. As a result, no cost-benefit analysis performed for the purposes of informing the decisions of local officials can provide useful instruction for federal officials in the matter of whether or not to commit federal funds to the project. They might as well accept the decisions of local policy makers that the proposed program is the proper and desired approach for the area.

In addition, every governing body or set of decision makers necessarily operates within substantial constraints with respect to the kinds of action it can effect and the territory within which those effects can be realized. This obviously leads to potential conflicts with other jurisdictions and other governing bodies in some cases. Cost-benefit analysis has to be undertaken at some scale and has to include a definition of the relevant area and population affected; the rest of the world is automatically excluded. For the policy makers there is no other alternative, for this is the universe in which they are assigned responsibilities to act and they must decide as best they can. As a result, the cost-benefit analysis will be shaped in terms of the values and goals of that particular universe, to the extent it is shaped by any goals or values other than those of the analysts. The effect of the analysis therefore will generally be to elaborate upon the rationale for a choice by those decision makers rather than to provide wholly new information for their use. When this is the case, it provides no substantial guidance to those who must make the decision.

It has become increasingly apparent in modern planning and public policy formulation that established objectives and policies should be the bases for public investment decisions. Alternatives must be weighed in terms of their ability to achieve an adopted set of policies, whether they relate to reduction of unemployment, increased mobility, enhancement of environmental quality, stabilization of social structures, promotion of reduction of growth, or centralization or decentralization of jobs.

Projects in any particular field – such as transportation – must be weighed and evaluated in terms of their contribution to a coherent set of overall policies for an area. Cost-benefit analysis, in its conventional form, provides little assistance in undertaking this evaluative process, although versions of cost-effectiveness analysis may. Generally, the technical support required is to determine, to the degree possible, how a particular action or project may or may not contribute to the attainment of given objectives. This can be achieved through impact analysis, applied to several alternatives, and such analysis is generally embodied in the very kind of planning process which leads to the identification of a "project."

Conventional cost-benefit analysis may divert attention from the proper conduct of such a planning process and the appropriate methods by which desirable actions are identified in furtherance of such policies, by focusing attention on methods of analysis and techniques of quantification rather than on policy formulation.

V. RECOMMENDED FURTHER ACTIONS

The selected impact statements presented in Chapter II were developed in an effort to assist the SCRTD in deriving meaningful data from the program studies that have been completed over the past two years. After meeting informally with the Public Information Committee, established under SCRTD's Manager of Planning and Marketing, we believe it would be useful to continue working on one or perhaps two of these impact statements. The most promising possibilities for public information purposes – i.e., those statements which will be most meaningful to the public – would be an expansion of the statement on access to job and other opportunities and that of discussing savings to private automobile users. In addition, we believe there is a need to shape and interpret the consultants' report for both the directors and for UMTA, and a need to study the cost-effectiveness of the selected transit modes and corridors.

Automobile Subsidies

As noted in the impact statement covering private automobile operating costs, we believe that city auto users fall far short of covering highway operating costs and that many costs to the City of Los Angeles which provide services to auto users exceed the revenues for these purposes. In San Francisco this excess cost over revenue amounts to approximately 50% annually. There is good reason to question the continuation of large and long-standing subsidy of the private automobile. Insofar as Los Angeles will be subsidizing its transit system (and this cost is going to be large), reducing the automobile subsidy would not only have the effect of reducing costs for city services, it would also reduce the subsidy required for transit. If the city and county vote for a mass rapid transit program in November, the consequences of encouraging overuse of private autos will become even more expensive. It is suggested, then, that we continue to develop data on private automobile subsidies that are now being made by the taxpayers in Los Angeles. The purposes of these data are to:

1. Demonstrate the pervasiveness of auto service costs in the public sector of Los Angeles, which has been largely overlooked.

2. Provide a better basis for estimating the magnitude of the costs.

3. Establish a basis for comparing the respective subsidies for auto and transit.

The approach that we would take would be to look at the expenditures by the City and County of Los Angeles and identify those expenditures that might be considered auto service. The principal budgets with which we would be working would be those of the Police and Highway departments, most of the courts, and City Attorneys' offices. Various overhead costs such as Civil Service Commission, Comptroller, Mayor's office, etc., can be

allocated to auto service expenditures. With such an allocation, we expect to be able to derive comparative numbers which will be expressed on a per capita and total aggregate basis of the automobile subsidy. While we have not made an estimate, it is expected that this subsidy – when compared to the projected per capita costs for a mass rapid transit system – will be another quantitative frame of reference for the individual voters.

Access to Opportunities

Chapter III-C compares the probable impact of the proposed expanded or improved rapid transit system in the South Central Los Angeles and Van Nuys communities. It is demonstrated that the South Central community, in particular, will not benefit greatly from access to existing jobs in the CBD but, perhaps, with the strategic placement of yards, shops, and/or maintenance areas the community could benefit directly from the jobs created by the expansion of the rapid transit operations. This finding is in contrast with our findings on the Van Nuys community which would benefit directly in terms of commuter time- and money-savings and convenience in their access to job opportunities.

It is suggested that additional research be completed on other communities in Los Angeles County to demonstrate the impact or lack thereof of the proposed system. While there is neither time nor budget available to perform this kind of analysis for all 78 communities in the county, we believe that analysis of one or two others could assist further in answering the questions of who pays and who benefits. As in the case of South Central Los Angeles, communities which would not benefit directly in terms of access to jobs could have increased access to other opportunities.

Synthesis Plan

In the "consensus report" and the supplementary technical documents, various "scenarios" or options have been developed and compared. Definitive descriptions from service and operational points of view have not been developed. We believe that a vital need of SCAG, SCRTD, and the voters is a succinct definition of a firm conceptual plan for a unified transit system which can be synthesized from all previous work.

This synthesis of the conceptual plan must be preceded by repeating and refining a clear definition of (a) goals and objectives of the transit program, (b) the geographical boundaries of the areas to be served, (c) service to be made available to the respective communities, and (d) any specific restrictions on service.

We believe that such a plan – in addition to being realistic, practical, and safe from an operational viewpoint – could include a description of the theoretical performance, derived from assumptions regarding reliability, service frequency, and speeds. We are not suggesting the development of technical specifications but rather a realistic description of the system which will preclude the kinds of frustrations and dissatisfactions and unforeseen costs which have characterized those mass rapid transit systems which have been recently completed or are now being completed in other cities.

So, a really satisfactory synthesis of all the planning that has gone on to date must not only result in the simplest transit network which will furnish the desired service: it should also recognize operational needs, provide for a judicious injection of advanced technology at least on proven performance bases, and determine desirable types and locations of support facilities and revenue schedules.

We believe we can produce such a synthesis within the next few months. This definition of a firm conceptual plan would become the basis of the community economic impact statement advising SCAG, SCRTD, and the voters, as well as the federal agencies, on (a) how much the service offered will cost the community and the individual voter, (b) how rapidly it could be implemented, and (c) the cost of service offered by credible alternatives.

These three areas of suggested additional research are offered in response to the SCRTD's questions relative to immediate needs for public information purposes. In addition to these three areas, the two impact statements and the "planning synthesis" effort (all of which can be completed in a six- to eight-week period), we are also suggesting a study effort as an alternative to cost-benefit analysis.

Cost-effectiveness

During our discussions on May 9, we suggested that a cost-effectiveness study of the proposed transit system would be more appropriate than a cost-benefit study. We are here proposing to study the cost-effectiveness of the selected mode, as described in the various Phase III reports, and the cost-effectiveness of the transit corridors selected. In a cost-effectiveness study, as opposed to a cost-benefit study, we will be able to compare various levels of investments required and express our findings in terms of financial performance.

The cost-effectiveness study will subject the entire system to an evaluation of efficiency which will allow us to predict the *best* manner of moving passengers from one point to another, from one sector to another, and between and among the centers of Los Angeles for the minimum number of dollars. We will be comparing the costs of private automobile versus the costs of moving passengers by bus, versus the costs of moving passengers by a fixed guide system. It is anticipated that some of the subsystems and perhaps some of the major components of the larger systems will be changed as opportunities for economies are revealed through this analysis.

The cost-effectiveness study will, in addition, allow the directors to test the system against societal goals and specific operating objectives of the district. It will allow for an analysis of the trade-offs entailed in alternative systems, within the framework of overall system costs and overall system benefits – as viewed by the public and by the directors, as well as by appropriate persons in the U.S. Department of Transportation. As recommended by other recent reports (CACORT and the Chamber of Commerce), this cost-effectiveness evaluation should be undertaken before irrevocable financial commitments are made to one system concept.

In evaluating the transit modes and corridors, we will weigh such factors as regional economic welfare, the need for fuel conservation, costs of pollution, concern for public health, and regional concerns for the auto-dependent society.

We believe that the cost-effectiveness study will be a logical starting point for determining the possible special revenue districts or separate taxing entities, and it will obviously expedite the preparation of the synthesis plan.

Our proposed study approach will allow for the development and/or refining of system parameters, criteria, and constraints; will establish criteria for system performance; will demonstrate the comparative economic advantages of the proposed system; and will be a measure of the resource utilization. Key indices to be monitored or assessed will be the proposed *coverage* of the system, the annual system usage, the probable equipment utilization, operating manpower requirements, and economics. These factors will be expressed in terms of areas served per area of SMSA, revenue rides per capita of SMSA, revenue vehicle-miles versus total vehicle-miles, and operating results (total revenue in terms of capital costs and direct revenue in terms of direct operating costs).

It is expected that we can utilize the data base already developed in the Phase III studies, that we can agree with the other consultants and the SCRTD staff on key indices to be monitored, and that recommendations for operating and facilities placement criteria will be developed in the course of our study. Again, these recommendations will not result in specific equipment or technology descriptions but rather will be in terms of the performance expected versus the goals of the SCRTD program.

The cost-effectiveness approach will then be used to prove the service criteria assumptions which underlie the proposed transit program, to adapt a network concept for the areas to be served, to locate rider access and interchange points in order to identify the real links needed, to determine the fleet size and composition, and to locate the support facility.

We believe that all of the actions recommended above can be accomplished during the next four months. Figure 8 shows our estimate of the time required to complete each of the tasks described. It is assumed that all of these tasks are priorities of the board and the SCRTD management, and that most of the information developed will be used for the Public Information Program.

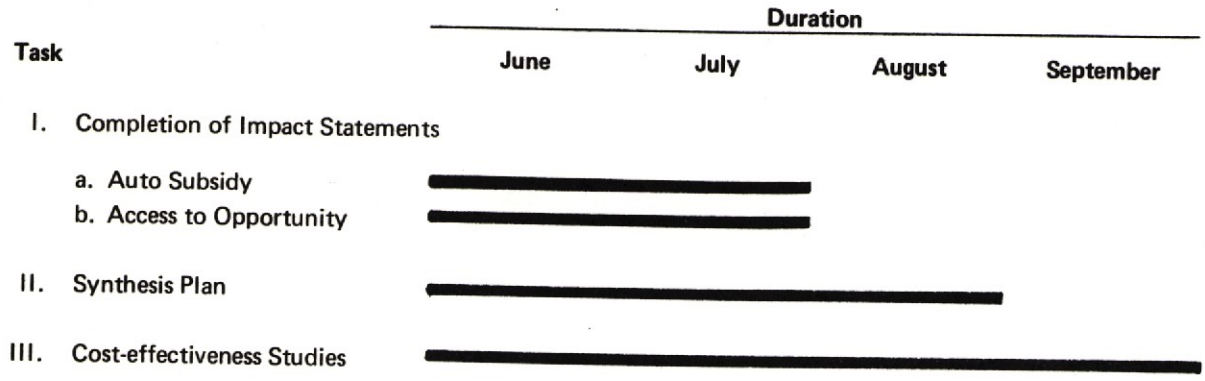

FIGURE 8 SCHEDULE FOR PROPOSED WORK