TRANSIT TECHNICAL STUDIES

SAN GABRIEL VALLEY IMPROVEMENT PLAN

Prepared For

SOUTHERN CALIFORNIA RAPID TRANSIT DISTRICT

by

Wilbur Smith & Associates

June, 1975

SOUTHERN CALIFORNIA RAPID TRANSIT DISTRICT

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Los Angeles, Calif. 90036

June 1, 1975

Mr. Howard R. Beardsley, Assistant Manager
Rapid Transit and Surface Planning Department
Southern California Rapid Transit District
1060 South Broadway
Los Angeles, California 90015

Dear Mr. Beardsley:

We are pleased to submit our report, San Gabriel Valley Transit Improvement Plan, prepared in accordance with our agreement of August 15, 1974. A comprehensive study of transit needs and potentials within the San Gabriel Valley has been undertaken. Transit attitudes and expectation surveys were conducted throughout the Valley and the transit requirements of each of the 31 cities were evaluated.

A series of alternative transit plans to accommodate the existing and future transit needs of the region were developed and evaluated. The evaluation of each alternative plan considered transit costs, patronage, number of vehicles required, and service of existing and potential demand. From this evaluation, a recommended plan has been developed. The recommended plan will accommodate the region's current and future travel requirements and will promote increased transit utilization in accordance with regional policies and planning goals.

The recommended plan has three major elements: a Fixed Transit Program, a Bus Rapid Transit Plan, and a limited Demand-Responsive Mini-bus Demonatration Project. The plan focuses on the El Monte Busway and calls for an extension of this facility to Pomona. Two new major rapid transit stations are recommended to be located in West Covina and Pomona.

We have appreciated the opportunity to provide our services for the Southern California Rapid Transit District and trust these recommendations will provide improved transit service to the communities of the San Gabriel Valley.

Respectfully submitted,
WILBUR SMITH & ASSOCIATES

William V. Sheppard

William V. Sheppard
Regional Vice President

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Foreward

The Los Angeles Metropolitan area has experienced tremendous population growth within the last decade, with an accompanying growth in travel. This increased demand for travel has led to the construction of freeways which are presently experiencing severe congestion during peak hours. This freeway congestion is further aggravated by air and noise pollution, and by recent energy problems. A well coordinated and efficient public transit system is necessary in order to alleviate these problems and satisfy the travel desires and needs of the people.

Transit service in the San Gabriel Valley is presently dominated by the San Bernardino Busway. This dominance of transit service by the Busway is as much psychological as it is functional.. This unique new facility has attracted the attention of the transit industry and has developed considerable popular appeal because of its high level of transit service and special identity. Additional innovative transit programs are required in the San Gabriel Valley to optimize other fixed transit routes and to improve transit services accommodated by the Busway.

A recommended transit improvement plan for the San Gabriel Valley has been developed to provide increased mobility for area residents, and to provide an efficient and competitive alternative mode of travel for workers. The near-term transit improvement plan set forth and evaluated in this study is based upon the rationalization of existing services through route alignment and extensions, the addition of new routes, and increases in bus frequencies. Special "priority" treatments are incorporated in the plan to make transit travel more attractive. These include the provision of special bus lanes and priority treatments on freeways and arterials for bus use and the development of fringe parking areas for easy transfer between cars and buses. The potential use of demand responsive buses equipped with special facilities for crippled, blind, or other handicapped persons is also examined.

Introduction

The San Gabriel Valley is one of the five major geographical regions that compose Los Angeles County. Located northeast of the Los Angeles Coastal Plain, the entire San Gabriel Valley encompasses approximately 348 square miles. The San Gabriel Valley is bounded geographically by the Foothills of the San Gabriel Mountains on the north, the Los Angeles and San Bernardino County boundaries on the east, the Puente Hills and the Los Angeles and Orange County boundaries on the south and the Repetto and San Rafael Hills on the west. The San Gabriel Valley contains 31 incorporated areas and had a population of 1,260,000 according to the 1970 Census. (Figure 1.)

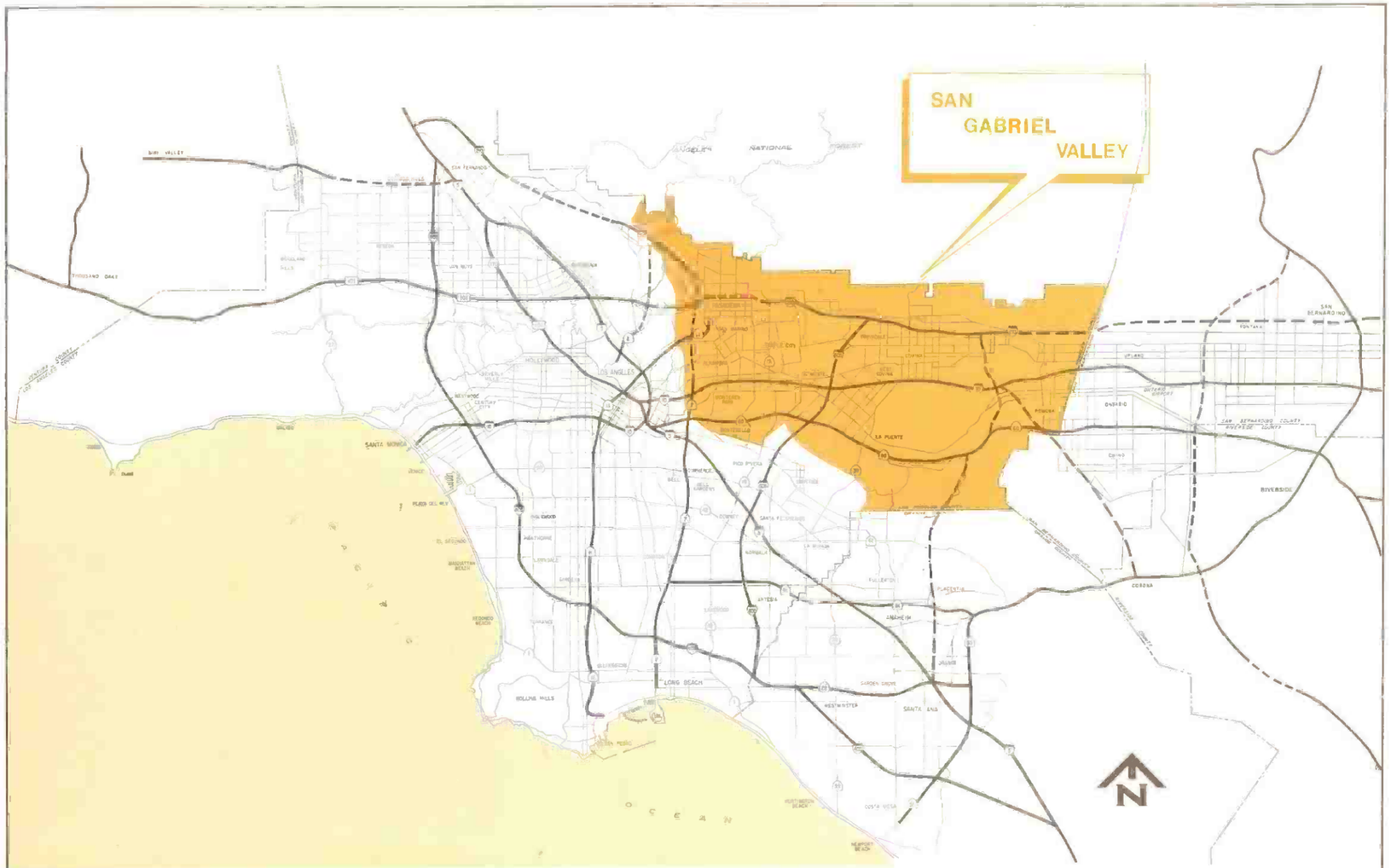
The San Gabriel Valley is divided into two general regions. The West San Gabriel Valley consists of an area approximately 135 square miles located to the west of the San Gabriel River. The West San Gabriel Valley had an estimated population of 710,000 in 1970. The East San Gabriel Valley with an area of 213 square miles, extends from the Los Angeles-San Bernardino County boundary to the San Gabriel River and has an estimated population of 540,000.

HISTORICAL DEVELOPMENT PATTERNS

The early development of the San Gabriel Valley was significantly influenced by the construction of the transcontinental railroads in the late 1870's and 1880's. Most of the incorporated cities in the San Gabriel Valley were established as stations along the lines of the Southern Pacific and Santa Fe Railroads. The majority of the urban population, business and industry activities of the San Gabriel Valley were concentrated along these fixed transportation routes.

A series of interurban electric railway lines were developed in the late 1890's and provided increased flexibility of travel for area residents. These interurban electric cars were utilized to open new areas for development as well as to serve local travel needs. In addition to the interurban lines, there were several local trolley lines feeding the main electric routes. Pasadena had a total of 10 trolley lines serving the commercial areas along Colorado Boulevard (Figure 2). Expansion of the cities within the San Gabriel Valley was primarily dependent upon the feasible distance and alignment of public transportation routes and the level of service that could be developed for each area.

The automobile along with increasing technological developments, highway construction and rising family incomes, significantly altered residential, commercial and industrial development patterns in San Gabriel Valley. The increase in



STUDY AREA

SAN GABRIEL VALLEY

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Figure 1

accessibility and mobility provided by the automobile, prompted an unprecedented period of postwar population and employment growth within the San Gabriel Valley. Freeways assumed the role previously played by the interurban rail lines in opening up and serving new land for development.

Population in the San Gabriel Valley grew from a total of 416,000 in 1945 to 577,800 in 1950. Between 1950 and 1960, the San Gabriel Valley had a population increase of 419,000 persons resulting in a total population of approximately 1,000,000 persons. The ten year period 1960-1970 had a similar pattern of continued urban growth, particularly in the East San Gabriel Valley. A total of 260,000 persons were added to the San Gabriel Valley during the 1960-1970 period, producing a 1970 population of 1,260,000.

THE EXISTING TRANSIT PROBLEM

While the population of the San Gabriel Valley had been growing and the residential locations shifting, the various transit systems serving the area have had difficulty maintaining pace with the changing travel patterns. Declining ridership resulted in reduced service and the declining revenues produced additional scheduling and service modifications to minimize transit losses. By 1965, the San Gabriel Valley's unparalled period of postwar population and employment growth had been accompanied by a drastic decline in public transportation use and service. Of the total population in the San Gabriel Valley in 1965, only non-drivers and low income persons depended heavily upon transit and those individuals had to select homes and occupations in those areas served by existing transit.

In recognition of the transit problems in the San Gabriel Valley, the Southern California Rapid Transit District in 1968 introduced a series of comprehensive short-range transit improvement programs. These transit service improvement programs resulted in expanded service and new lines of operation throughout the San Gabriel Valley. More than ten new bus lines were added to the existing program including modifications in route locations, hours of operation, and frequency of service as well as the incorporation of private and municipal lines into the Southern California Rapid Transit District service area.

Recently federal requirements to improve air quality within the Southern California Region have resulted in an increased public awareness for the need to provide improved transit service in order to attract greater transit patronage. The energy crisis, which has resulted in a scarcity of fuel and recognition of the need to optimize our current resources, has also more clearly emphasized the need to improve current transit service within the Southern California Region.

The local, state and national governments have also recognized the need to provide improved transit service and have provided additional resources and funding techniques for improved transit operations. These programs including the subsidies of fares at a twenty-five cent level by the Los Angeles County Board of Supervisors and the recent Urban Mass Transportation Act of 1974 to provide operating subsidies, offer new programs and opportunities for improved transit service throughout the region.

AUTHORITY AND PURPOSE OF STUDY

The present San Gabriel Valley Transit Technical Study has been authorized by the Southern California Rapid Transit District in order to respond to the immediate needs for improved transit service within the San Gabriel Valley. The basic purpose of the study was to provide the Southern California

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COLORADO BOULEVARD, 1910

Rapid Transit District with a series of recommendations to improve existing transit service in the area. The recommendations of this study are to result in a comprehensive, coordinated and simplified transit system which will satisfy existing and latent transit demands for the residents of the San Gabriel Valley.

The San Gabriel Valley Transit Plan Study is intended to assist the Southern California Rapid Transit District in achieving their short term objectives of providing improved transit mobility and accessibility to the residents of their service areas. Specifically, the objectives of the San Gabriel Valley Transit Plan Study are:

1. Determine and document the existing and latent transit needs of the San Gabriel Valley.

2. Develop and evaluate a broad range of alternative transit concepts which will satisfy these existing and latent needs, and predict their patronage, their indirect benefits, and their economic feasibility.

3. Recommend a viable bus transit system and establish priorities for its implementation, and

4. Establish a schedule and develop an immediate implementation plan of the recommended transit system.

The study is also to include a procedure for monitoring, evaluating, and reporting on transit system performance.

STUDY SCOPE AND TECHNICAL APPROACH

To accomplish the study objectives and to provide the required scope of services, a technical approach and work program were developed which would provide the Southern California Rapid Transit District with the depth and detail of transit recommendations required for implementation of an improved transit program. The study approach and work program involved four major phases of work and included 34 individual work tasks. The four major phases of work for the San Gabriel Transit Improvement Plan were:

Phase I - Reconnaissance and Inventory

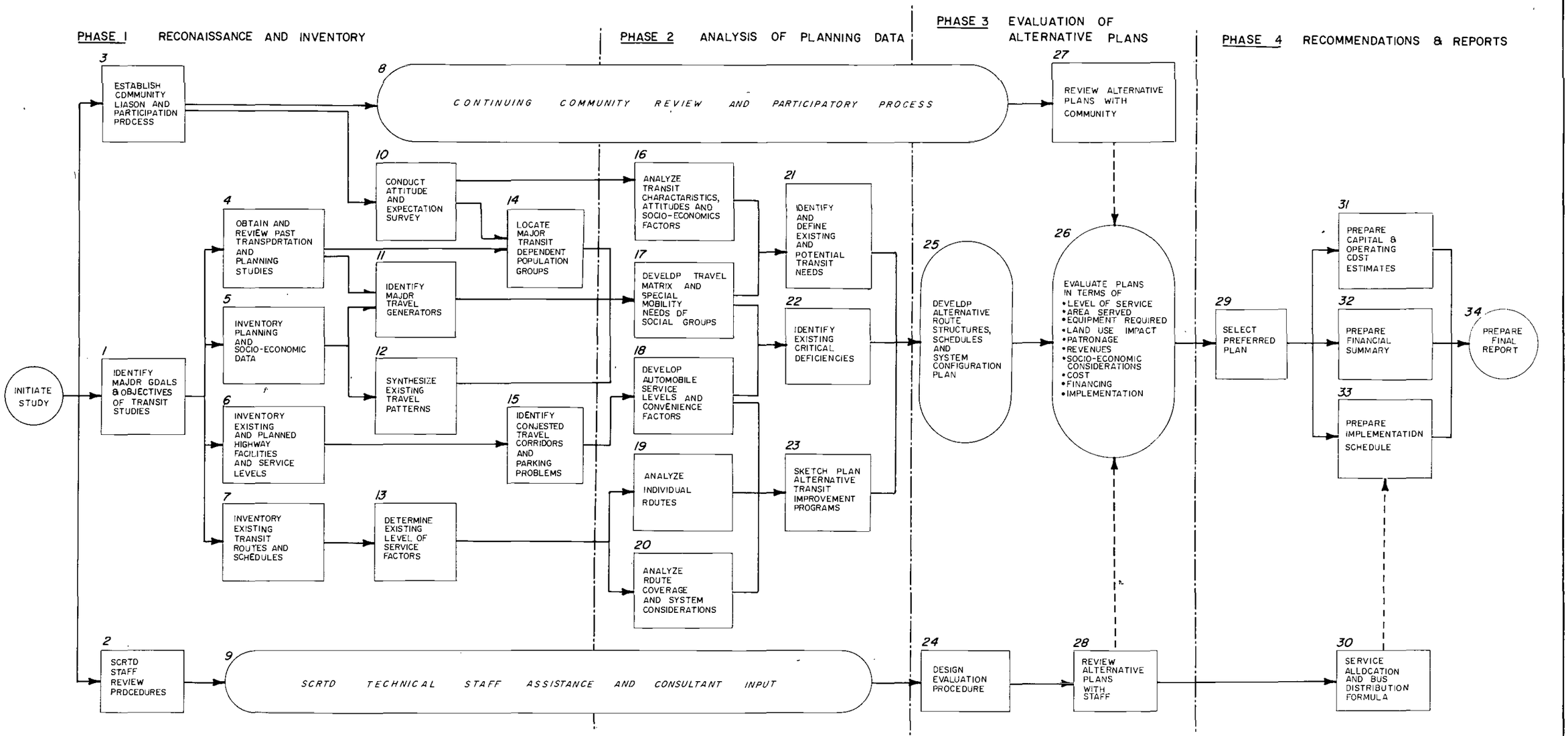
Phase II - Analysis of Planning Data

Phase III - Development and Evaluation of Alternative Plans

Phase IV - Recommended Plan and Final Report

As shown in Figure 3, the study was initiated with a series of technical and community meetings to discuss the major goals and objectives of the transit program. Individual community objectives and viewpoints relative to future transit service were identified by a series of 30 meetings held throughout the San Gabriel Valley. These meetings were supplemented by careful technical review of the proposed work program by the Southern California Rapid Transit District staff.

A series of inventories and field studies were undertaken to identify current transportation and socio-economic characteristics. Major travel generators and travel patterns in the Valley were carefully identified and evaluated. Current transit service was related to existing travel demand and



WORK PROGRAM
SAN GABRIEL VALLEY IMPROVEMENT PLAN

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Figure 3

the current level of service provided by transit in the Valley was determined. A series of attitude and expectation surveys were conducted throughout the San Gabriel Valley with the assistance of the Southern California Rapid Transit District and various community newspapers. A total of 6,000 responses were received relative to transit attitudes and characteristics in the San Gabriel Valley. Major transit-dependent groups were identified and current travel constraints and congestion areas located.

In Phase II, the inventory data was assimilated and an analysis of the travel and socio-economic data was undertaken. Individual transit characteristics and mobility needs of social groups were identified. Existing and latent transit needs in the study area were determined and related to existing transit route coverage and system configurations. The critical deficiencies with the existing transit system were identified and alternative sketch plans were developed and reviewed with the SCRTD staff.

Phase III involved the development of alternative routes structures and service levels. The plans were then evaluated in terms of level of service, area served, and benefit to the community. Based upon a careful review of the alternative plans, a final recommended plan was developed. Phase IV involved the selection of the recommended plan and the development of the final report which included plan refinement and equipment requirements.

ORDER OF PRESENTATION

The study began with an inventory and appraisal of the existing transit service and development patterns. These data area contained in Chapter 2. Surveys and forecasts of future travel demands and transit characteristics were developed and these data, including future travel demands, bus passenger flows, and potential bus trips were identified. The potential for diversion of car riders to transit lines as well as the latent travel potential in the low income population, the elderly and the handicapped, we well as those households without cars were developed and are presented in Chapter 3.

The planning of the transit system for the San Gabriel Valley is outlined in Chapter 4. Included are transit planning principles, system concepts, and a full description of the alternative plans developed and evaluated. The recommended plan in presented in Chapter 5. Included in the recommended plan are the recommended system characteristics, estimated use, and an implementation plan outlining equipment and personnel requirements.

Existing Conditions

In developing a comprehensive transit improvement program, it is first necessary to inventory and review the existing land use patterns, travel characteristics, and socio-economic conditions of the study area. These patterns and characteristics, when related to existing transit routes and projections of future growth and development, serve to identify current transit deficiencies and highlight potential areas for new service.

In addition, the historic patterns of transit usage and patronage and the region's attitudes and expectations relative to future service need to be closely examined. These data are important in establishing coverage and frequency criteria for the proposed systems.

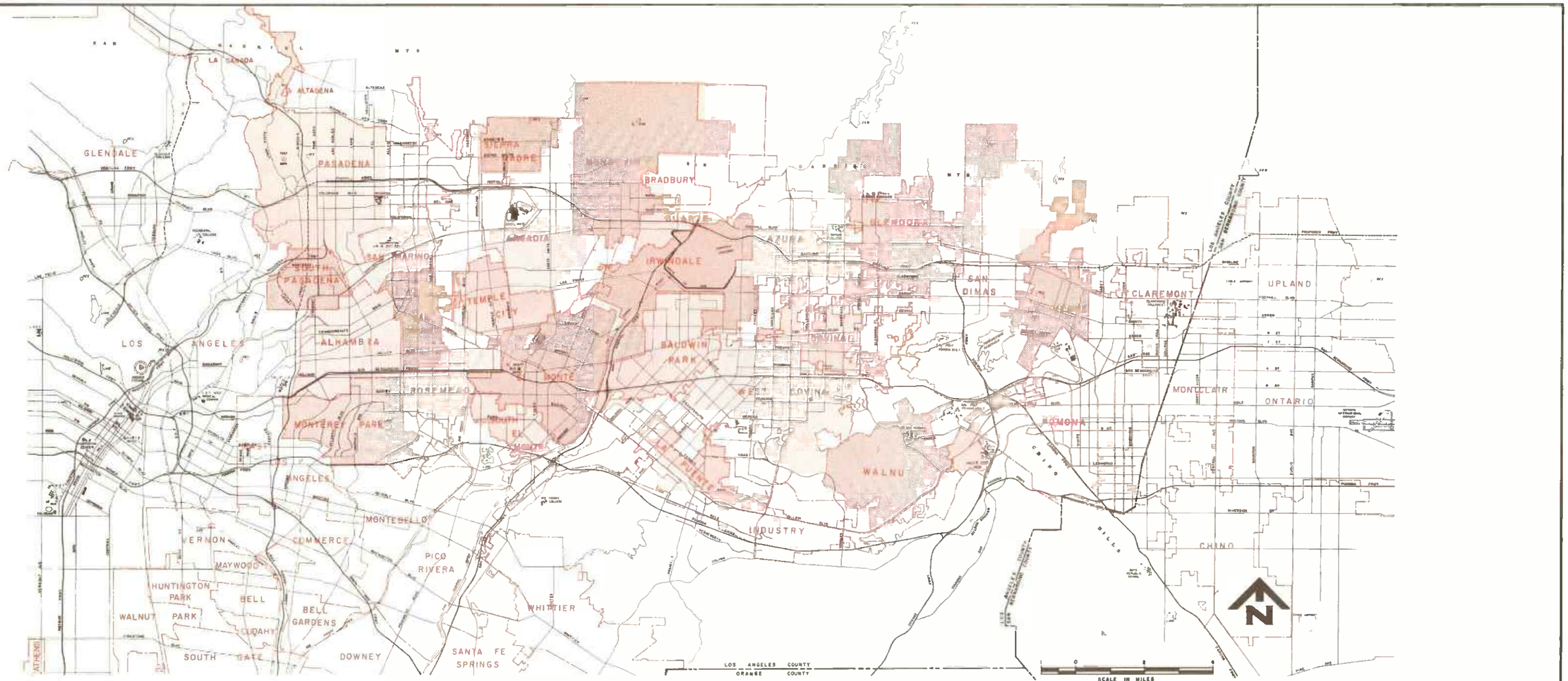
Accordingly, a comprehensive inventory and analysis of demographic, socio-economic, travel, and attitude data in the San Gabriel Valley and its 31 incorporated cities was undertaken (Figure 4.) The 1970 Census of Population, SCAG Employment Statistics, and LARTS travel forecasts were the principal sources of the data for the proposed studies. Information was developed on population, labor force, employment opportunities, age, income, vehicle ownership, and number of physically handicapped individuals for each census tract in the study area. In addition, existing information relative to transit attitudes was supplemented by special surveys conducted by Wilbur Smith & Associates in the major communities of the San Gabriel Valley.

STUDY AREA

The San Gabriel Valley is defined as the residential, commercial, and industrial area located east of the Central Business District of Los Angeles and extending to the San Bernardino County line. The San Gabriel Valley is bounded on the north by the San Gabriel Mountains and on the south by the Puente and San Jose Hills.

The units of analysis for the transit planning program in the San Gabriel Valley corresponded to the Southern California Association of Governments (SCAG), Regional Planning Agency Statistical Areas (RSA), and Caltrans (LARTS) Statistical Areas. As shown in Table 1, and illustrated in Figure 5, the West San Gabriel Valley is represented by SCAG and RSA Zone 25 and LARTS Statistical Areas 17, 18, 28, and 29. The East San Gabriel Valley is represented by SCAG and RSA Zones 26 and 27 which correspond to LARTS Areas 30, 31, 36.

Each LARTS Statistical area is further divided into traffic analysis zones. A total of 135 traffic zones have been designated for the San Gabriel Valley area. The traffic zones are composed of



COMMUNITIES IN THE
SAN GABRIEL VALLEY

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Figure **4**

STATISTICAL DIVISION

SAN GABRIEL VALLEY

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Figure **5**

Table 1

STATISTICAL AND COMMUNITY DIVISION

WITHIN THE SAN GABRIEL VALLEY

STUDY AREA	SCAG AND RSA ZONE	LARTS STATISTICAL AREA	COMMUNITIES
West San Gabriel Valley	25	17	Pasadena, Altadena
		18	Arcadia, Monrovia, Sierra Madre, Temple City, Duarte
		28	San Gabriel, Alhambra, Monterey Park
		29	El Monte, Rosemead
East San Gabriel Valley	26	30	Glendora, Azusa, Irwindale, Baldwin Park, Covina, West Covina
		36	La Puente, Hacienda Heights
	27	31	Claremont, Pomona, San Dimas

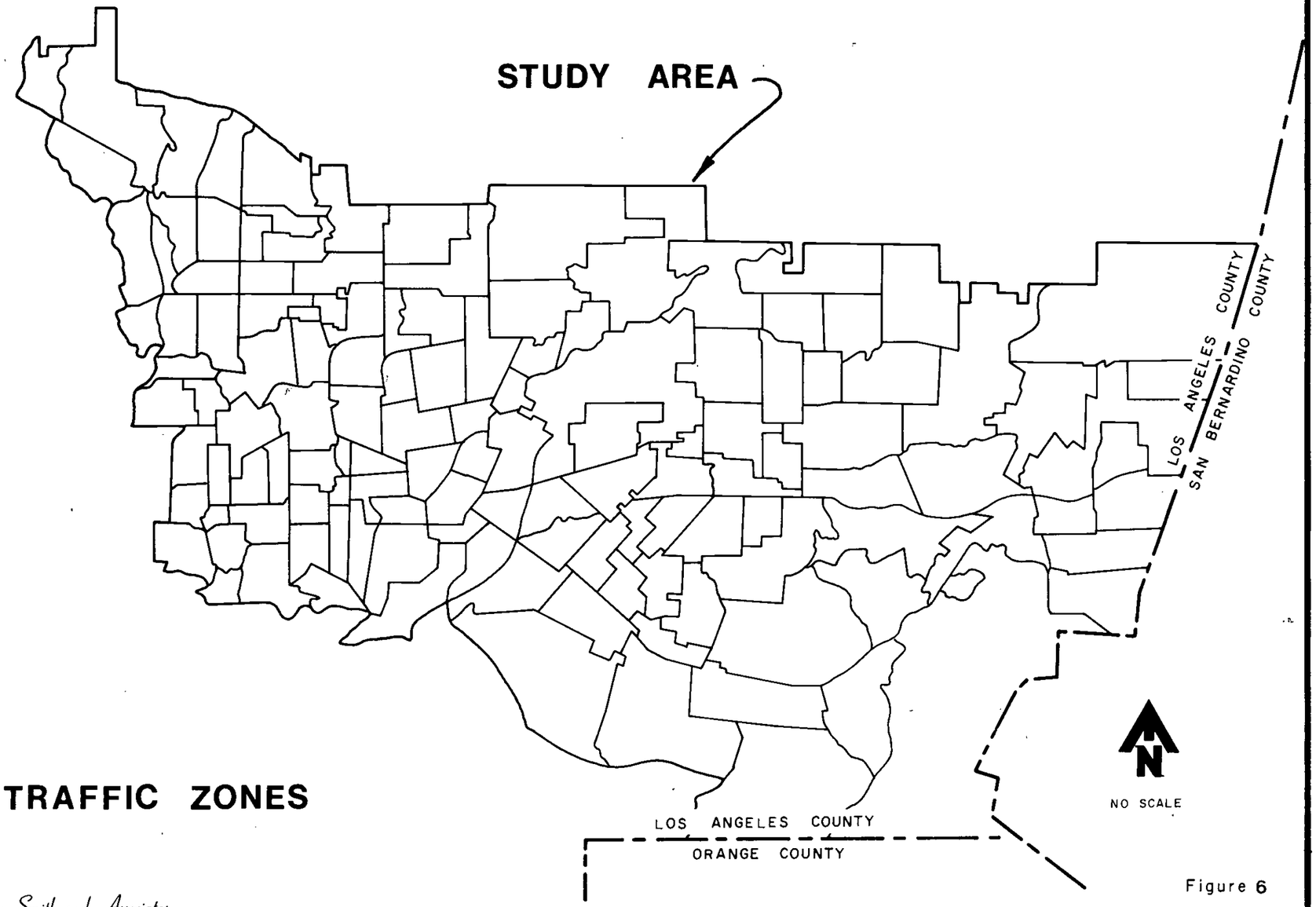
individual census tracts with the region, with the traffic zones generally containing from 1 to 5 census tracts. (Figure 6.)

SOCIO-ECONOMIC CHARACTERISTICS

The character and composition of the San Gabriel Valley was carefully studied and analyzed. Population growth, employment opportunities, residential density, and age and sex characteristics have a direct relationship with trip making and travel demands. This information, when viewed relative to economic and spatial development patterns, is extremely important in identifying potential transit patrons.

Population

The San Gabriel Valley has experienced a sustained period of continued growth and development.



TRAFFIC ZONES

Figure 6

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The growth of the San Gabriel Valley has closely paralleled the rapid growth of Los Angeles County with the San Gabriel Valley attracting and maintaining approximately 15 to 25 per cent of the total population of the county. As shown in Figure 7, the sustained and continued growth rate of the San Gabriel Valley was projected to level off beginning in 1970. SCAG's preferred forecast of population growth to 1990 is essentially a "no growth condition" for the period 1970 to 1980 with population in the San Gabriel Valley having a growth rate of approximately one per cent. Growth to the end of the century, based upon the preferred forecast, would bring the area's population to 1,381,000 persons representing a 9.6 per cent increase over the 30 year period.

The historical population growth of the San Gabriel Valley for the past 70 years and the projected growth through the year 2020 is shown in Table 2.

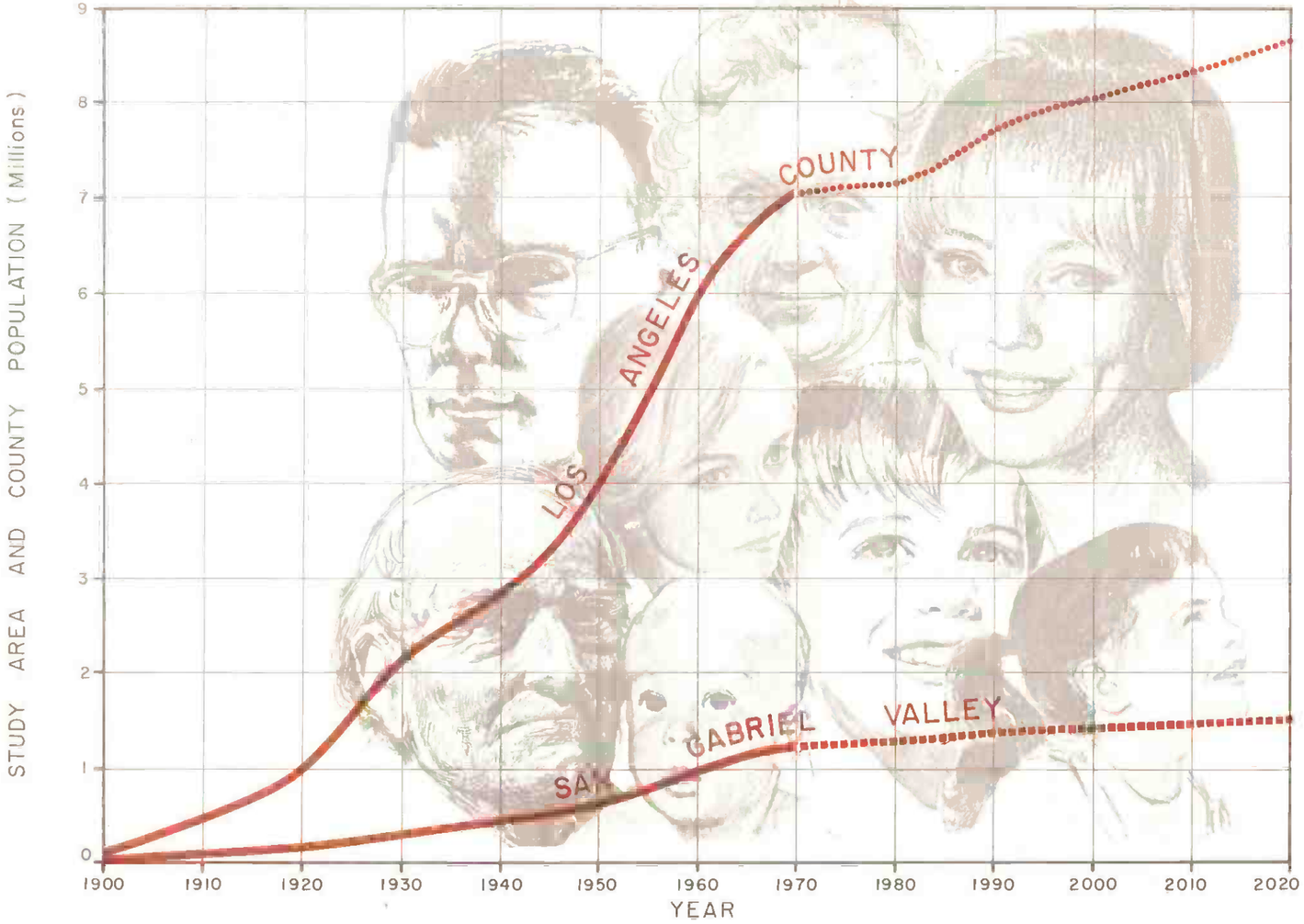
Table 2

POPULATION GROWTH
San Gabriel Valley

YEAR	SAN GABRIEL VALLEY	PER CENT GROWTH	LOS ANGELES COUNTY	PER CENT GROWTH
1890	10,046	149	101,454	68
1900	25,000(1)	240	170,298	196
1910	85,000(1)	112	504,131	86
1920	180,000(1)	48	936,455	136
1930	266,752	24	2,208,492	26
1940	349,488	65	2,785,643	42
1950	577,828	72	3,965,057	52
1960	996,750	26	6,040,805	17
1970	1,259,833	1	7,038,764	2
1980(2)	1,272,131	6	7,184,417	7
1990(2)	1,346,997	3	7,701,359	4
2000(2)	1,381,002	-	8,031,066	-
-	-	-	-	-
2020	1,445,675	5	8,687,210	4

(1) Estimated Wilbur Smith & Associates

(2) Projected



(Source: Southern California Association of Governments)

POPULATION GROWTH TRENDS

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Figure **7**

The West San Gabriel Valley's long development history is evident in the higher growth rates that have been experienced in the Pasadena and San Gabriel - Alhambra areas. These areas were largely urbanized before 1940 and have more than doubled their population in this 30 year period. Monrovia and El Monte have experienced a quadrupling of population in the same period from an estimated population of 65,000 in 1940 to over 250,000 persons in 1970. The East San Gabriel Valley has grown from 35,000 population in 1940 to an estimated 540,000 in 1970.

By contrast, portions of the San Gabriel Valley between Pomona and the San Gabriel River which were largely rural in 1940, remained unchanged until the mid-1950's. Rapid growth in this area since 1955 has significantly increased the population within this hillside area with population going from less than 32,000 persons in 1940 to an estimated 140,000 in 1970.

Population Density

The density of population within the urbanized areas is a critical and important factor in the development of criteria relative to transit service. The National Committee on Urban Transportation has found that a population density of 5.3 persons per acre is necessary to support regular transit service. However, areas of the population density ranging from 3.4 to 5.0 would usually warrant a limited amount of transit service. Densities below 3.0 will generally produce insufficient levels of transit ridership for commercial operations.

The present population density, expressed in persons per acre, in the San Gabriel Valley is shown in Figure 8. Densities with more than 10 persons per acre represent an estimated 6,400 persons or more per square mile. The heaviest concentration of population with densities well above 10 persons per acre in the San Gabriel Valley are located in the Pasadena, Alhambra, and Covina areas.

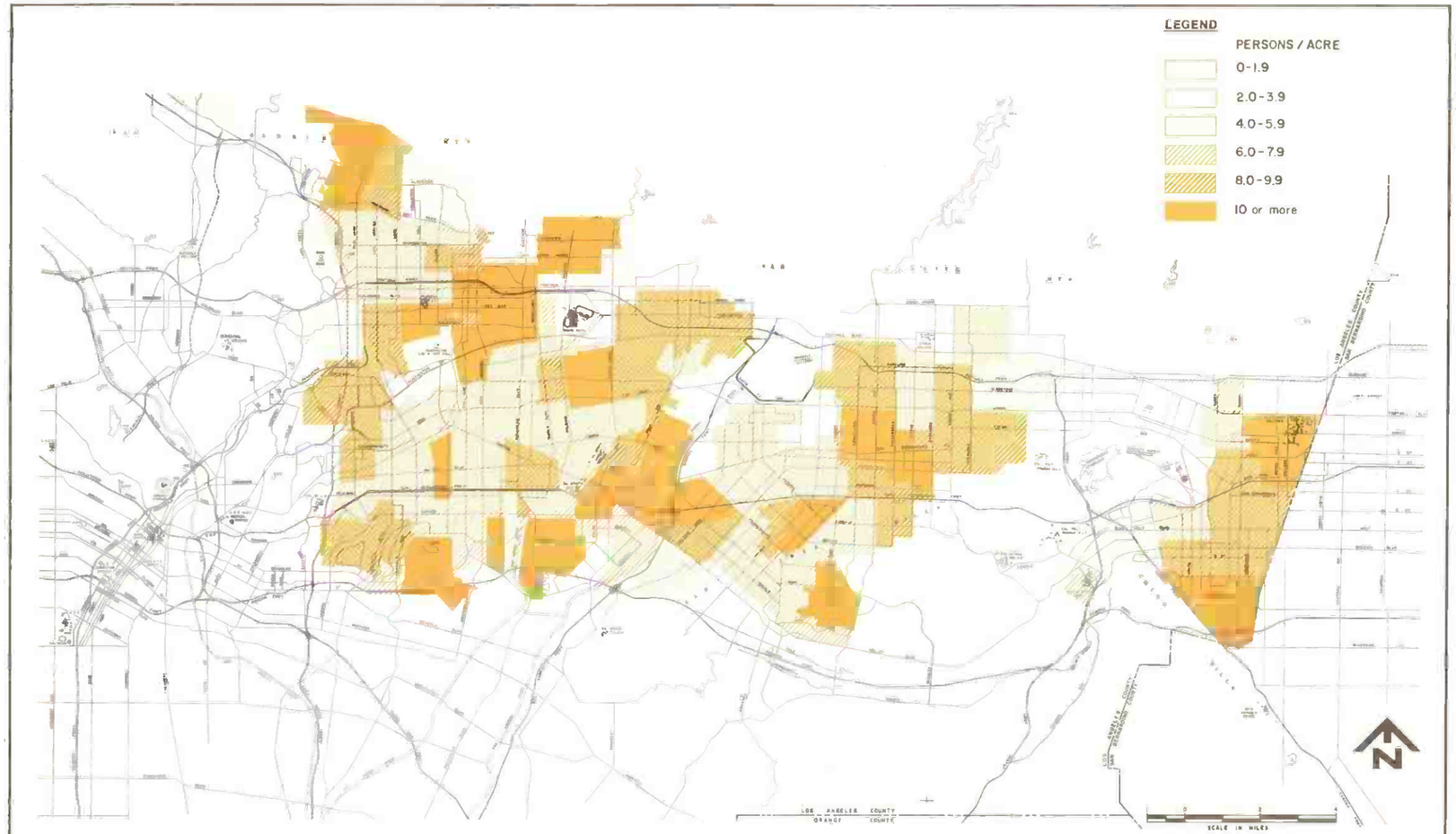
The City of Pasadena has the highest population density in the San Gabriel Valley with population densities ranging from 15.5 to 17.7 persons per acre. The areas of highest population density within Pasadena are centered along Colorado Boulevard and Lake Avenue. Population densities north of Colorado Boulevard up to Woodberry Road also range above 10.0 persons per acre. Alhambra has population densities exceeding the 10.0 persons per acre along Main Street near Fremont Avenue and extending south along Atlantic and Garfield Avenues. San Gabriel's maximum population densities are located along the border of Temple City, near Rosemead Boulevard.

The areas of lowest population densities are found in the hillside areas of Walnut and Diamond Bar and along the foothill areas of Bradberry and Monrovia. Population densities below 2.0 persons per acre are also found in the quarry and gravel pit areas of Irwindale. Low population densities are also found in the extreme northern area of Claremont and Glendora. Several isolated pockets of low density residential development are located along Irwindale Avenue in Irwindale and in La Puente.

The average population density in the San Gabriel Valley is 5.7 persons per acre or approximately 3,600 persons per square mile.

Labor Force and Employment

Labor force and employment statistics have been compiled and analyzed relative to work trip



POPULATION DENSITY

SAN GABRIEL VALLEY

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Figure 8

patterns within the study area. The labor force, similar to the population of the San Gabriel Valley, increased by more than 35 per cent during the 1940's. Opportunities for employment grew faster than the population rate as the San Gabriel labor force increased from 280,000 in 1960 to nearly 450,000 in 1970 or by more than 60 per cent.

The resident labor force, at 523,200 in 1970, exceeded available jobs by approximately 8 per cent. Since many jobs held by residents of the San Gabriel Valley are located outside the principal study area, it is estimated that approximately 25 per cent of the available jobs are filled by commuters to the San Gabriel Valley. (Figure 9).

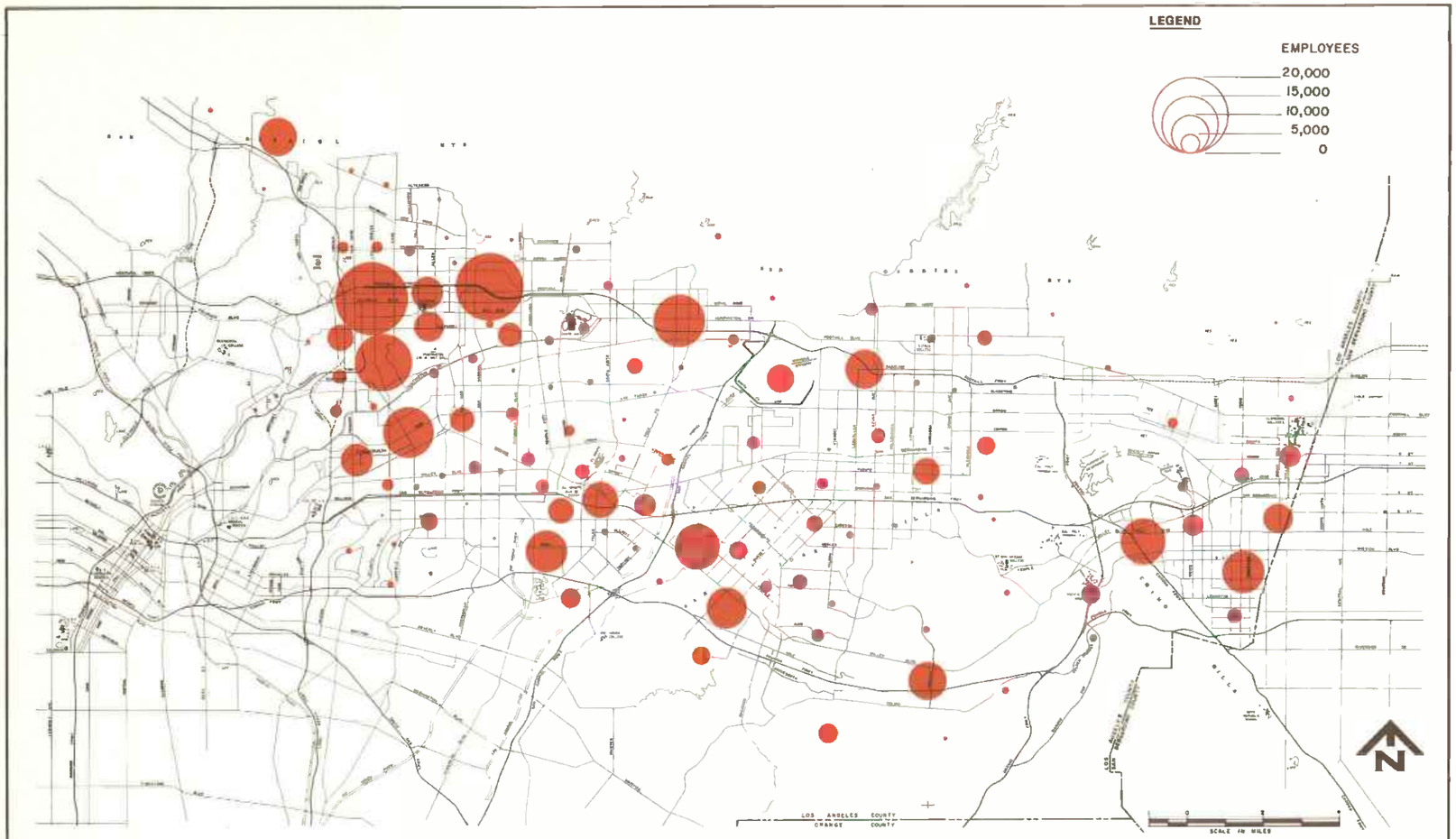
Table 3

LABOR FORCE OF FOUR CITIES IN SAN GABRIEL VALLEY

AND CITY OF EMPLOYMENT

	CITY OF RESIDENCE			
CITY OF EMPLOYMENT	ALHAMBRA	PASADENA	POMONA	W. COVINA
Alhambra	4,793	566	209	454
Bellflower	9	8	13	11
Burbank	236	399	28	104
Carson	33	6	20	21
Compton	79	102	37	41
Downey	96	40	75	112
Glendale	168	788	76	97
Hawthorne	5	33	9	54
Inglewood	20	63	33	52
Lakewood	24	-	-	7
Long Beach	143	246	207	221
Los Angeles	9,838	7,456	1,559	4,456
Norwalk	40	-	12	10
Pasadena	1,332	23,570	191	478
Pico Rivera	41	20	40	99
Pomona	98	107	13,760	593
Redondo Beach	13	36	13	21
Santa Monica	124	77	53	55
South Gate	102	75	12	41
Torrance	17	29	7	44
W. Covina	67	87	364	4,182
Whittier	68	48	91	228
TOTAL	27,122	46,080	29,917	26,408

Source: U.S. Department of Commerce, Bureau of Census, Journey to Work, 1970.



MAJOR EMPLOYMENT LOCATIONS

SAN GABRIEL VALLEY

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Figure 9

SCAG's preferred population forecasts indicate employment opportunities and labor force will be nearly balanced by the year 2000. It is estimated that there will be 520,000 available job opportunities within the San Gabriel Valley and an estimated resident labor force of 530,000 persons.

Major employment locations within the San Gabriel Valley are shown in Figure 9. The areas with the highest concentrations of job opportunities are located in the Pasadena area. The largest number of jobs within the San Gabriel Valley are located along California Boulevard in Pasadena. The LARTS zone located along the border of California Boulevard, Fair Oaks Boulevard, Colorado Boulevard, and Lake Avenue contains an estimated 19,000 job opportunities. The Duarte area along the Foothill Freeway and the industrial areas of Alhambra and South El Monte have the next highest employment concentrations within the San Gabriel Valley. Extremely high concentrations of employment locations are also found in the La Puente-Industry areas and the Pomona areas of the San Gabriel Valley.

The lowest employment concentrations are found in the eastern sections of the San Gabriel Valley north of Claremont and in the western residential areas of Pasadena and Alhambra.

Extremely light concentrations of labor force are also located in the western section of Pasadena as well as in Altadena and in the hillside areas of Walnut and Diamond Bar.

The resident labor force of the San Gabriel Valley is estimated at 523,200. The distribution of the labor force roughly parallels the population in the San Gabriel Valley with the highest resident labor force population being found in the Pasadena, Alhambra and San Gabriel areas. The most significant imbalance of labor force and employment opportunities are located in the cities of Sierra Madre, Monrovia and Bradberry.

The location of the resident labor force within the San Gabriel Valley is illustrated in Figure 10.

Family Income

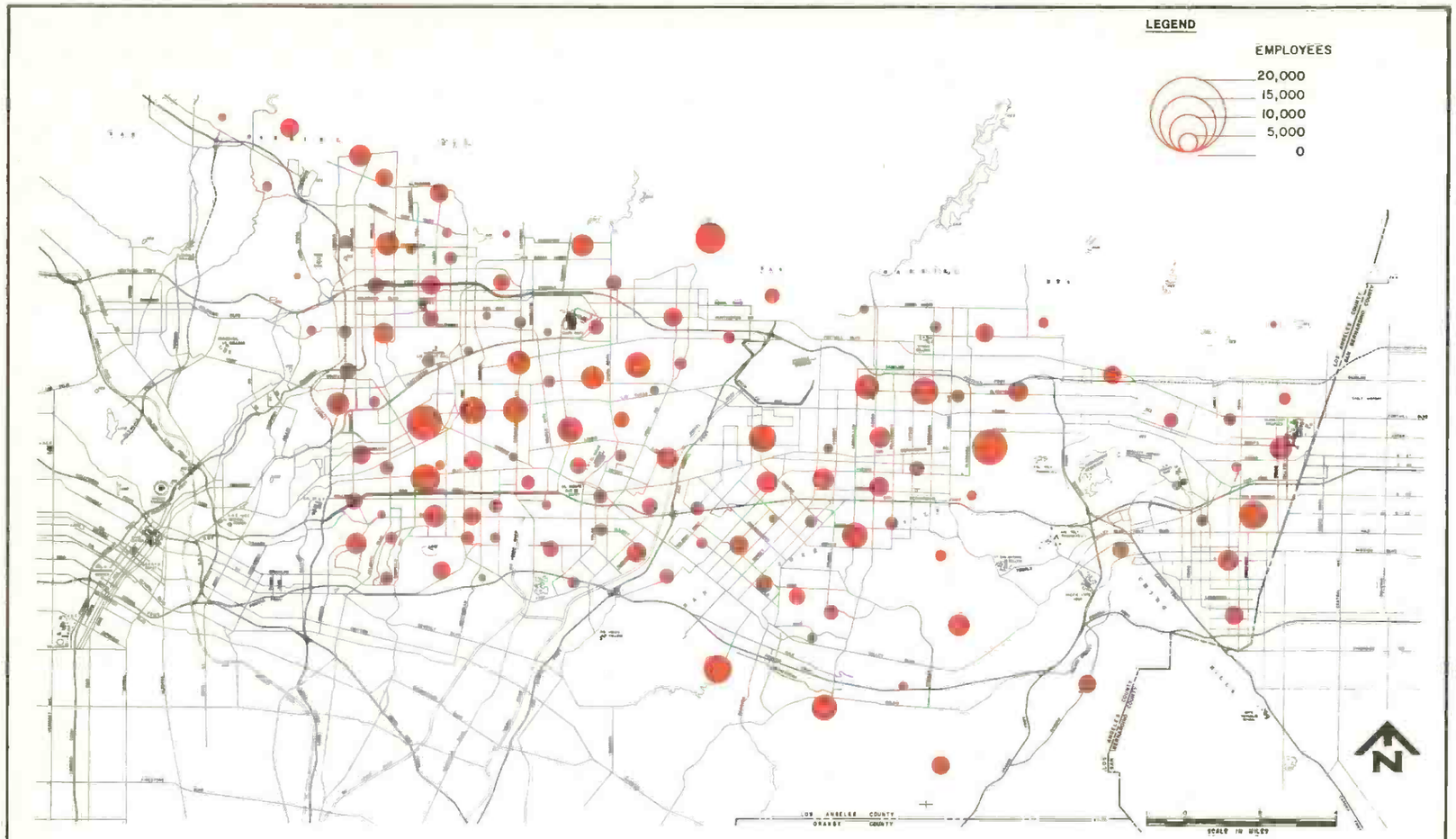
It has been found that lower income families are more heavily dependent upon public transportation for their basic travel needs than middle or high income families. There are two measures of family income available from most of the area planning studies and the 1970 Census: (1) medium family income and, (2) the percentage of households in each census tract with an income below poverty level.

Figure 11 shows the number of zones within the San Gabriel Valley with median income levels below $9,000 a year.

Table 4 lists the major cities which have a high percentage of families having an income below the poverty level. The concentrations of poverty level families are in the Pasadena, Pomona, South El Monte and Baldwin Park areas. They are 38 zones in these areas which represent about 30,000 individuals that have a family income below the national established poverty level. The Pomona area also has several concentrations of census tracts which have families with incomes below the $9,000 limit. In addition, several areas are located in the Baldwin Park, La Puente area.

Automobile Ownership

Automobile ownership has been determined to have a great impact on trip generation and modal choice characteristics. High car ownership rates



RESIDENT LABOR FORCE
SAN GABRIEL VALLEY

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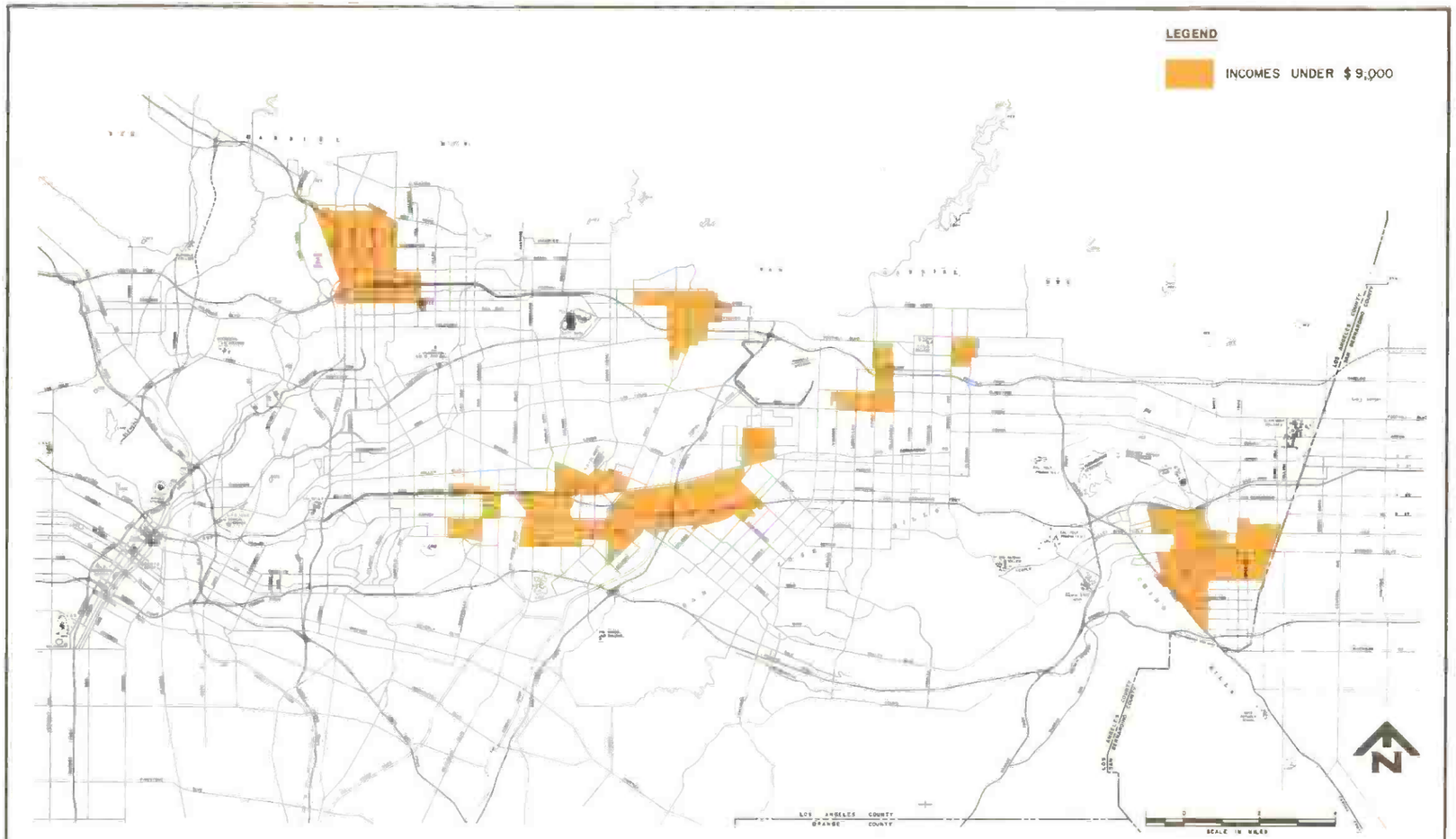
Figure **10**



MEDIAN - LOW INCOMES AREAS

SAN GABRIEL VALLEY

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Figure 11

Table 4

HOUSEHOLD WITH INCOME BELOW POVERTY LEVEL

San Gabriel Valley

CITY	*MEDIAN* INCOME	*PER CENT WITH INCOME* BELOW POVERTY LEVEL [1]
Alhambra	$11,004	5.4
Altadena	12,055	5.6
Arcadia	15,022	3.6
Azusa	9,651	10.0
Baldwin Park	9,224	9.7
Covina	11,958	4.2
El Monte	8,981	10.9
Glendora	12,806	4.6
Hacienda Heights	14,064	4.0
Monrovia	9,633	9.4
Monterey Park	12,383	3.9
Pasadena	10,825	7.7
Pomona	10,014	9.4
Rosemead	9,501	9.9
San Gabriel	11,184	5.5
Temple City	11,719	3.5
West Covina	13,118	4.1

for households generally yield high trip generation with corresponding low transit usage characteristics. Conversely, households with none or one car available for trip making tend to generate less trips, however, transit usage characteristics are more pronounced. Figure 12 shows the percentage of non-vehicle households for each census tract in the study area.

Table 5 shows the vehicle ownership characteristics of several of the principal cities of the San Gabriel Valley. There is an average of 1.8 vehicles per household within the study area. This is slightly higher than the average for Los Angeles County.

There are 36,400 households with no vehicles available in the San Gabriel Valley. Major concentrations of the no vehicle households are located in Pasadena, Alhambra, Monrovia and El Monte, where approximately half of the non-vehicle families reside.

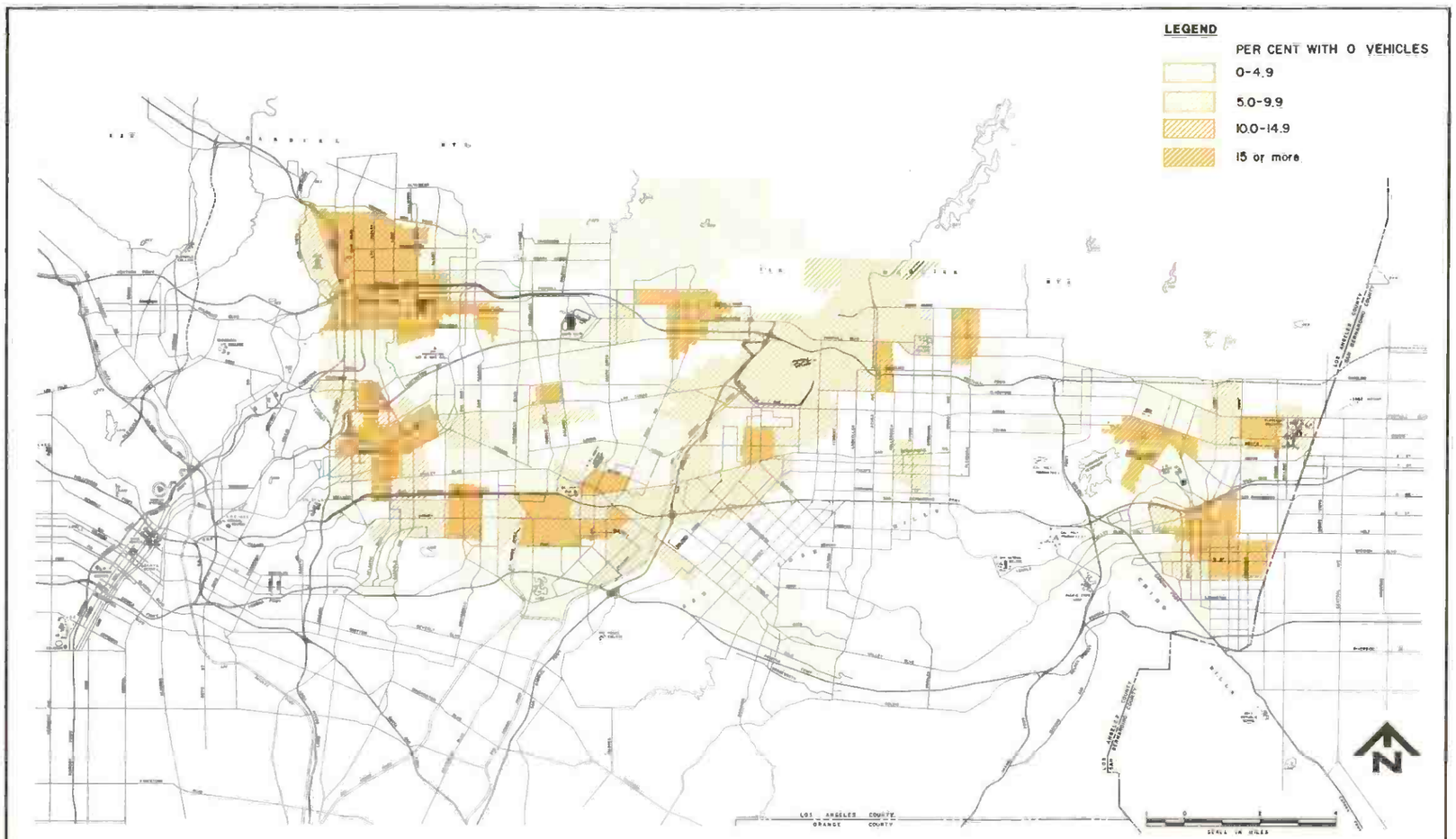
The Pasadena area has the largest concentration of households with no vehicles available as there are approximately 17 census tracts where 15 per cent or more of the households have no vehicles available. Similar clustering of census tracts where 15 per cent or more of the households have no vehicles available for travel are found in Alhambra between Atlantic Boulevard and Garfield Avenue and near Rosemead Boulevard in Rosemead and South El Monte along Garvey Avenue.

The City of Pomona has several census tracts near Town Avenue where 15 per cent or more of the households are estimated to have no vehicles available.

Areas of Covina and West Covina are the principal cities that have a relatively large number of households with one or more vehicles available.

There are a total of 8,773 households with no vehicles available within the city limits of Pasadena. Pomona, Alhambra and El Monte also have significant concentrations of households with no vehicles available. Thirty per cent of the households in Pasadena did not have a car available while West Covina has less than 2.2 per cent of the households (380) owning no vehicles.

The largest concentrations of two car or more households are located in Alhambra and West Covina.



HOUSEHOLDS WITH NO VEHICLE

SAN GABRIEL VALLEY

Wilbur Smith & Associates

Figure 12

Table 5

AUTOMOBILE OWNERSHIP

San Gabriel Valley

COMMUNITY	NUMBER OF HOUSEHOLDS WITH VEHICLES AVAILABLE				TOTAL NUMBER OF HOUSEHOLDS
	0	1	2	3 OR MORE	
Alhambra	3,626	12,152	7,774	1,572	25,124
Altadena	1,246	5,133	5,983	1,454	13,816
Arcadia	757	4,909	6,496	1,784	13,946
Azusa	813	3,660	2,669	695	7,837
Baldwin Park	1,471	5,860	4,879	1,037	13,247
Covina	588	3,859	4,244	881	9,572
El Monte	2,830	11,643	6,910	1,504	22,887
Glendora	636	3,096	4,238	1,180	9,150
Hacienda Heights	141	2,142	4,955	1,362	8,600
Monrovia	1,495	5,073	3,741	687	10,996
Monterey Park	1,144	6,176	6,984	1,686	15,990
Pasadena	8,773	20,079	12,860	2,896	44,608
Pomona	3,104	12,481	9,764	2,193	27,542
Rosemead	1,501	6,055	4,499	918	12,973
San Gabriel	1,121	4,607	3,985	764	10,477
Temple City	819	4,202	4,209	946	10,176
W. Covina	380	5,655	9,540	3,093	18,668
Subtotal	30,445	116,782	103,730	24,652	275,609
Remainder of San Gabriel Valley	5,892	43,348	51,257	13,401	83,898
TOTAL	36,337	160,130	154,987	38,053	359,507

The City of West Covina has 393 households or 20 per cent of the 16,889 households with two or more automobiles available for trip making.

Age Characteristics

Previous studies have shown that large proportions of the age group 65 and over are transit users. Many of these citizens no longer have an automobile available for their use and they are forced either to use public transportation or request services of a neighbor or relative for their basic travel needs.

There are over 111,300 persons aged 65 or over living in the San Gabriel Valley. These 111,300 persons represent approximately 8.4 per cent of the total study area population. Figure 13 shows the proportion of the population in this age group for each census tract within the study area. Approximately 60 per cent of the total elderly population are concentrated in ten of the older cities in the San Gabriel Valley.

As shown in Table 6, these ten cities have a total elderly population of 68,250 persons which represent approximately 61 per cent of the total 111,300 residents over 65. Pasadena has the largest proportion of residents over age 65 or over with 17.1 per cent followed by Alhambra with 16.4 per cent of resident population being 65 or over. These adjacent towns have the combined elderly population of about 30,000 persons or 26.0 per cent of the elderly population group living within the San Gabriel Valley.

There are 425,742 persons under age 16 living within the study area or approximately 32 per cent of the total population. Table 7 shows the number of persons within this age group by individual communities. The City of Pasadena has the largest concentrations of persons under 16 years of age

Table 6

AGE CHARACTERISTICS

San Gabriel Valley

CITY	NUMBER OF PERSONS 64 AND OVER	TOTAL 1970 POPULATION	PER CENT
Pasadena	19,391	113,327	17.1
Alhambra	10,174	62,125	16.4
Pomona	7,772	87,384	8.9
El Monte	5,570	69,837	8.0
Altadena	4,968	42,380	11.7
Arcadia	4,887	42,868	11.4
San Gabriel	4,033	29,176	13.8
Temple City	3,835	29,673	12.9
Monrovia	3,814	30,015	12.7
Rosemead	3,806	40,972	9.3
Subtotal	68,250	547,757	12.5
Study Area Totals	111,305	1,259,833	8.8

with 28,598 and 25,675 individuals respectively. These individuals represent approximately 30 per cent of the total population in these two communities. Figure 14 shows the percentage of the population under age 16 for each census tract within the study area based on the 1970 Census data.

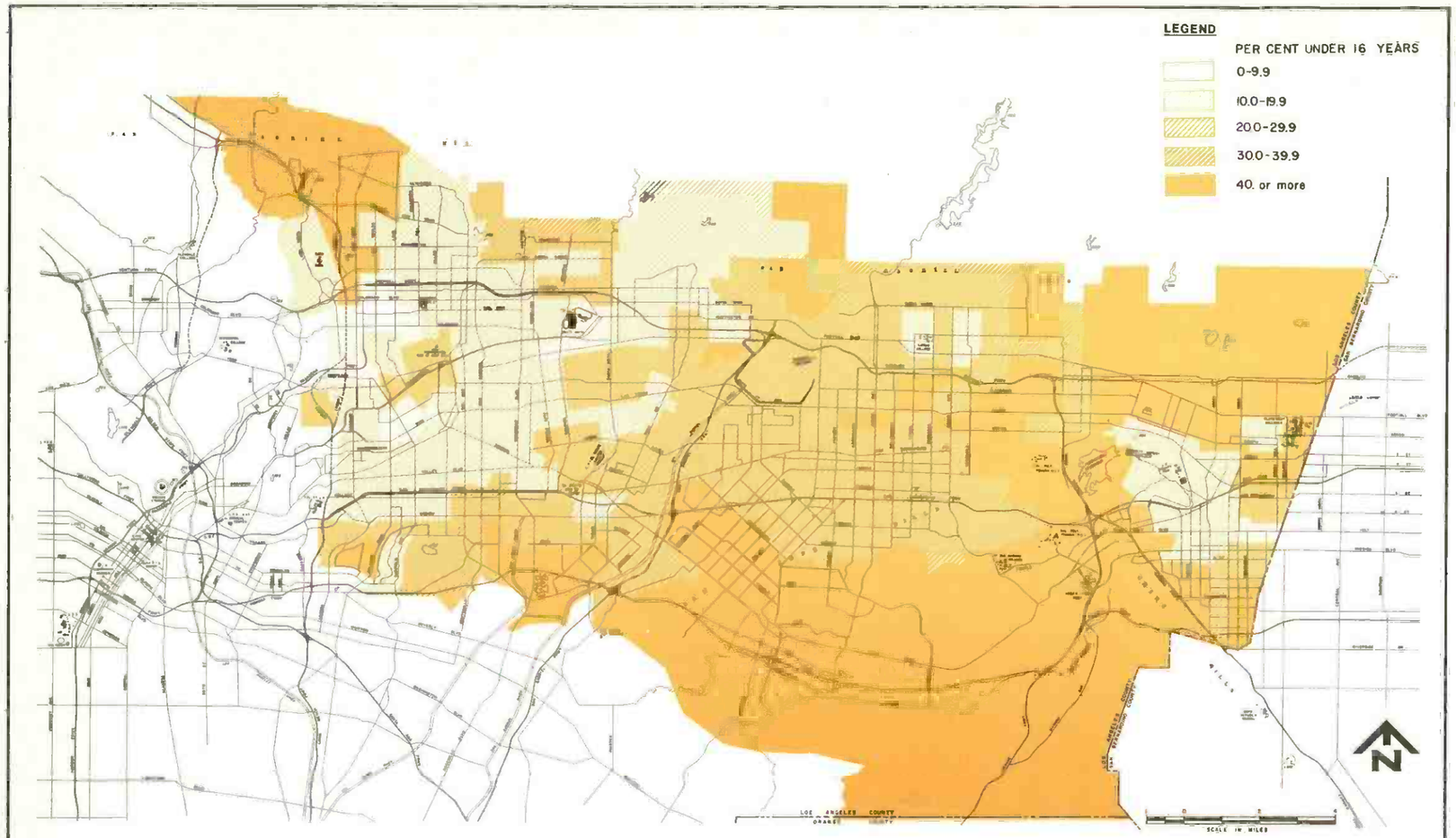
As can be seen, for the illustration, nearly half of this age group live in the unincorporated areas of Los Angeles County. An estimated 191,269 individuals or approximately 45 per cent of the total 16 or under age group reside in the unincorporated areas of the County.

POPULATION AGE 65 AND OVER

SAN GABRIEL VALLEY

Wilbur Smith & Associates

Figure **13**



POPULATION AGE 16 AND UNDER

SAN GABRIEL VALLEY

Wilbur Smith & Associates

Figure 14

Table 7

AGE CHARACTERISTICS

San Gabriel Valley

CITY	NUMBER OF PERSONS AGE 16 AND UNDER	TOTAL 1970 POPULATION	PER CENT
Alhambra	12,874	62,125	20.7
Altadena	12,381	42,380	29.2
Arcadia	10,875	42,868	25.4
Azusa	8,389	25,217	33.3
Baldwin Park	17,788	47,285	37.6
Covina	9,631	30,380	31.7
El Monte	22,785	69,837	32.6
Glendora	10,612	31,349	33.9
Hacienda Heights	16,114	35,969	44.8
Monrovia	8,121	30,015	27.1
Monterey Park	14,133	49,166	28.7
Pasadena	25,675	113,327	22.7
Pomona	28,598	87,384	32.7
Rosemead	13,309	40,972	32.5
San Gabriel	7,467	29,176	25.6
Temple City	8,126	29,673	27.4
W. Covina	23,709	68,034	34.8
Subtotal			
Remainder	135,155	422,732	41.4
TOTAL	425,742	1,259,833	33.8

LAND USE PATTERNS

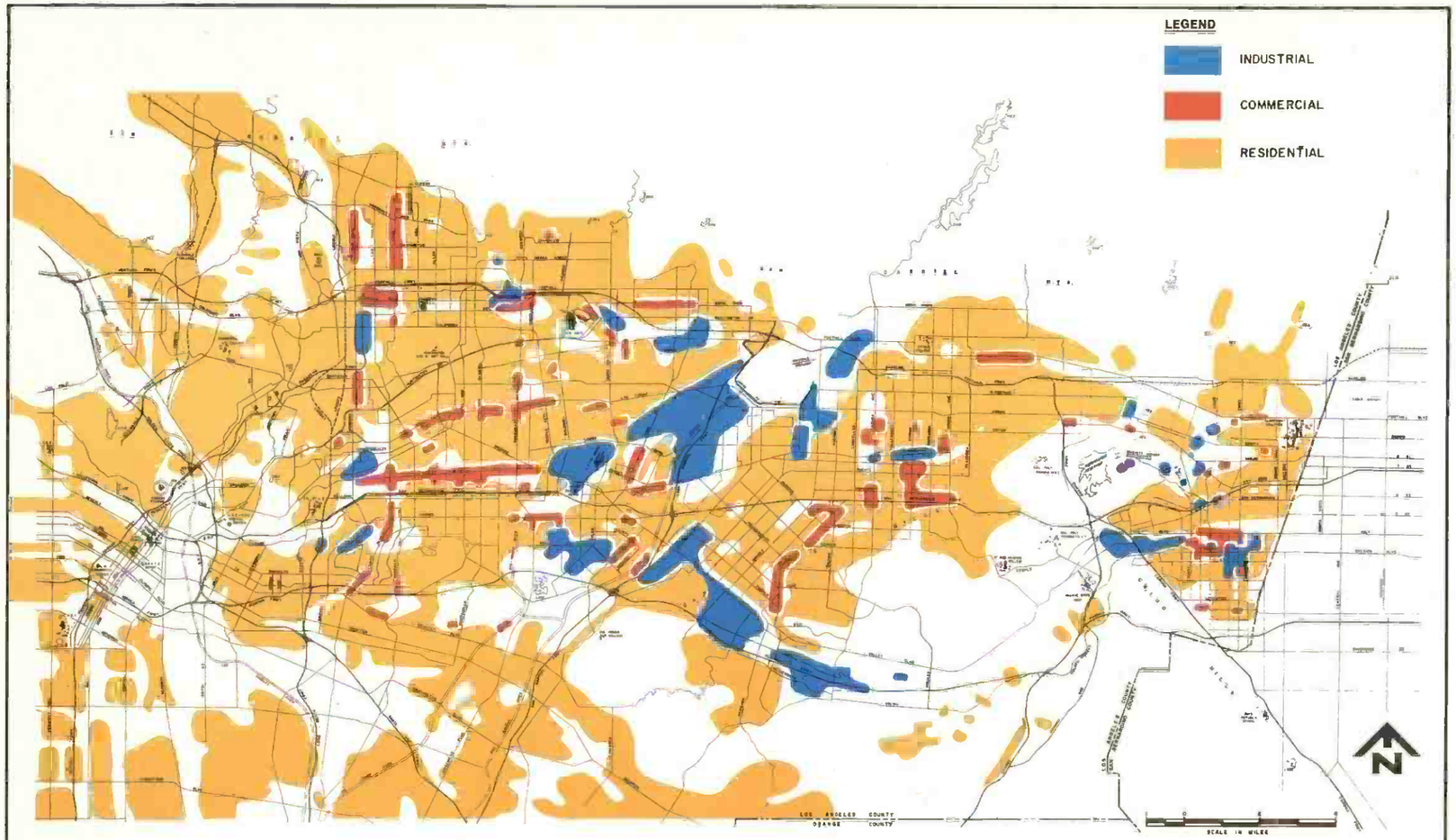
The land use and development patterns of the San Gabriel Valley were carefully examined in order to identify potentially significant factors which influence travel demand and transit patronage. The spatial patterns of residential, commercial and industrial facilities within the San Gabriel Valley shape and determine the travel characteristics of the region. Utilizing future population forecasts, a carefully developed profile of existing and potential transit patronage within the area can be developed.

In order to locate areas that influence travel patterns, and therefore, the transit needs of the San Gabriel Valley residents, a comprehensive inventory of the existing and expected land use activities was undertaken. Land use activities within the San Gabriel Valley were categorized into four groups --- residential, commercial, industrial and public service --- and are shown in Figure 15.

The general plans of the individual communities were also reviewed for consideration in developing a transit improvement plan, so that future as well as existing needs can be accommodated.

Pasadena - Alhambra

The Pasadena-Alhambra area is one of the older and, therefore, more developed areas in the San Gabriel Valley. As in the case in most of the Valley, Pasadena and Alhambra are largely residential with heavy commercial development along Colorado Boulevard and Lake Avenue. Downtown Pasadena is the second largest Central Business District in the Los Angeles Metropolitan area in terms of retail sales and employment.



LAND USE PATTERNS

SAN GABRIEL VALLEY

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Figure **15**

Sierra Madre-Monrovia-Bradbury-Duarte-Temple City-Arcadia

The Sierra Madre-Monrovia-Bradbury-Duarte area lies at the foot of the San Gabriel Mountain. The north-eastern third of this area is mountainous and the remainder is relatively flat. Approximately 50 per cent of the land area is residential and about 5 per cent is strip commercial with the major development along Huntington Drive and Foothill Boulevard. A major recreational facility for the entire L.A. Metropolitan area is the Santa Anita Race Track located in Arcadia. The first major enclosed retail mall in the San Gabriel Valley has just opened at Huntington Drive and Baldwin Avenue.

San Gabriel-Temple City-Alhambra-Monterey Park-Rosemead

This area, has over 50 per cent of its land area devoted to residential land use. As in the case with most areas in the San Gabriel Valley, the commercial development is along the major streets such as Valley Boulevard, Las Tunas Drive, Garvey Drive and San Gabriel Boulevard. However, this is low density commercial development which means that it attracts a small number of customers and business which are scattered about a large area. Industrial activity is negligible, utilizing only about 3 per cent of the land area.

El Monte-South El Monte

Approximately half of the El Monte-South El Monte area is devoted to residential development. The only substantial commercial development is along Valley Boulevard and Peck Road in El Monte. South El Monte plans to devote almost 40 per cent of their land area to industry by 1985, and at present, approximately 30,000 persons work in small industrial shops.

Glendora-Azusa

Glendora and Azusa lie between the San Gabriel Mountains and the Foothill Freeway. There are no major commercial development except for the Central Business Districts and along Alosta and Azusa Avenues. The cities' industrial activities are centered along the western limits of Azusa near the Santa Fe Dam.

Baldwin Park-Covina-West Covina

West Covina is the major commercial activity center of the San Gabriel Valley. Eastland Shopping Center and West Covina Shopping Center are the major facilities within the Covina and West Covina area. These are two areas in which there is a cluster type commercial development rather than strip activity as in the remainder of the valley. The remainder of the land area is devoted primarily to residential uses. Baldwin Park and the Covina CBD have small conventional business centers.

Irwindale

The Irwindale area is one of the major industrial activity centers in the San Gabriel Valley. This is primarily a result of the quarrying operations adjacent to the Santa Fe Dam. The majority of the remaining land area is used for residential since there is no commercial activity, except for scattered individual establishments.

La Puente-Industry

La Puente is primarily residential with a small conventional business center, and some strip development along Glendora Avenue. The majority of the area is industrial with a small amount of land devoted to residential use. These cities are linear in shape and follow the base of La Puente Hills

resulting in a major proportion of the land area remaining vacant or becoming low density residential.

Pomona-Claremont-La Verne-San Dimas

The Pomona-Claremont area is one of the more well developed areas in the San Gabriel Valley. Most of the land is used as residential but strip commercial development has taken place along Holt Boulevard and Foothill Boulevard. About one-fourth of the land in this area is devoted to recreational uses around the Los Angeles County Fair Grounds and Puddingston Reservoir.

Claremont, La Verne and San Dimas all have small conventional downtowns. The Pomona business center was redeveloped as a mall 15 years ago; however, it has declined in recent years. The Civic Center is growing along the southwest periphery of the city.

TRAVEL DEMANDS AND TRANSPORTATION SERVICES

The residents of the San Gabriel Valley generate approximately 3.6 million daily person trips. This travel demand is principally accommodated by the automobile operating on an extensive network of freeways, expressways, and arterials. Transit service is provided on a limited number of the principal roadway routes within the study area.

Of the total 3.6 million daily person trips made in the San Gabriel Valley, approximately 2.5 million vehicle trips are made by automobile carrying an estimated 3.5 million persons. The Southern California Rapid Transit District currently provides 2,000 daily transit trips which carry an estimated 39,300 person trips. Transit service therefore, currently accounts for approximately 1.1 per cent of the total trips made within the San Gabriel Valley.

Highway Facilities

The highway facilities serving the San Gabriel Valley extend over an area approximately 40 miles long by 10 miles wide. The basic roadway network extends from approximately 2 miles south of the San Bernardino Freeway north to its natural barrier, the San Gabriel Mountains.

Three major east-west radial freeways, the San Bernardino, Pomona, and Foothill Freeways carry an estimated 350,000 vehicles within and through this corridor daily.

The San Bernardino Freeway - Interstate Route 10 is a multi-land east-west freeway connecting the Los Angeles Central Business District with the San Gabriel Valley, the Pomona Valley and the San Bernardino Valley. The San Bernardino Freeway accounts for a significant amount of interstate truck, bus, and commuter traffic between Los Angeles and cities to the east. The freeway has six to twelve lanes throughout its entire length. A geometrically restricted six lane segment of roadway between Pointe Avenue and Holt Avenue is currently being widened to eight lanes by Caltrans. This project is scheduled for completion in mid-1975 and also includes modifications and improvements to undercrossings and ramps.

The Pomona Freeway - The Pomona Freeway extends from the Central Business District of Los Angeles to Riverside extending along the foothills of La Puente and San Jose Mountains. The freeway has six to eight lane widths throughout its length and carries between 79,000 and 100,000 vehicles per day.

The Foothill Freeway - Interstate 210 is presently completed throughout the major portion of its length in the San Gabriel Valley. Current construction in the east end of the San Gabriel Valley will extend the proposed freeway to San Bernardino. In addition, the major interchange to link the Foothill Freeway to the Ventura Freeway and the central part of Pasadena is scheduled for completion in 1975. This major freeway provides high speed freeway access to the residents of the Valley along the foothills of the San Gabriel Valley.

The San Gabriel Valley is also served by several north-south facilities. These freeways include the Pasadena Freeway, the Long Beach, the San Gabriel, and the Orange Freeways. These high level freeways are spaced at 5 mile intervals across the floor of the Valley.

The Pasadena Freeway - This freeway extends along the western border of the study area and provides interchanges with I-210, I-10, and the Pomona Freeway. The Pasadena Freeway, State Route 11, is a multi-lane radial freeway connecting Pasadena and South Pasadena, portions of Glendale, Altadena, and northeastern Los Angeles with the Central Business District. Average daily traffic on this freeway at the Golden State Freeway interchange is 89,000 vehicles per day. The Pasadena Freeway is unlike the other Los Angeles freeways in several respects. Being the oldest freeway in the county, built in the 1940's, the section of the Pasadena Freeway, north of Interstate 5 follows a circuitous alignment paralleling the Arroyo Seco channel and has several areas with substandard ramp and lane sections. The roadway in this section is six lanes wide.

The Long Beach Freeway - The Long Beach Freeway, State Route 7, is a major north-south radial linking Long Beach to Pasadena. This facility has an uncompleted section of roadway in which a court injunction has been filed. The City of South Pasadena is proposing an alternative plan to the State's adopted route for completion of the proposed route. Current travel on the Long Beach Freeway ranges from 60,000 to 100,000 vehicle trips per day.

The San Gabriel Valley Freeway - Interstate Route 605 is a circumferential freeway extending from Interstate 210 to the Santa Ana Freeway providing interchanges with the San Bernardino Freeway and Pomona Freeway. Travel volumes on the San Gabriel Freeway ranges from 25,000 to 75,000 vehicles per day.

The Orange Freeway - The Orange Freeway is located at the eastern extreme of the study area, providing north-south service for residents of the East San Gabriel Valley. An interchange is provided with the Foothill Freeway at the north and San Bernardino and Pomona Freeways on the south. Alignment of the Orange Freeway carries it to the east of the Puddingstone Reservoir and slightly east of the Cal-Poly Pomona University.

Arterial Facilities

The major arterial facilities in the study area include a series of north-south and east-west facilities. The major north-south facilities in the San Gabriel Valley include Atlantic Boulevard, Garfield Avenue, Rosemead Boulevard, and Peck Road in

the West San Gabriel Valley and Azusa Avenue, Citrus Avenue and Garvey in the East San Gabriel Valley. The major east-west streets include San Bernardino Road, Valley Boulevard, Arrow Highway, Colorado Boulevard in Pasadena, Huntington Drive and Foothill Boulevard in the northern section of the county and Mission Boulevard, and Holt Avenue in the central section of the county.

PUBLIC TRANSPORTATION

Public transportation service in the San Gabriel Valley is provided by the Southern California Rapid Transit District. A total of 38 lines are presently operated in the San Gabriel Valley. The existing route structure is shown in Figure 16.

Two principal types of service are provided the residents of the San Gabriel Valley by SCRTD. These two types of service include:

- Express transit service
- Local route service

Express Service

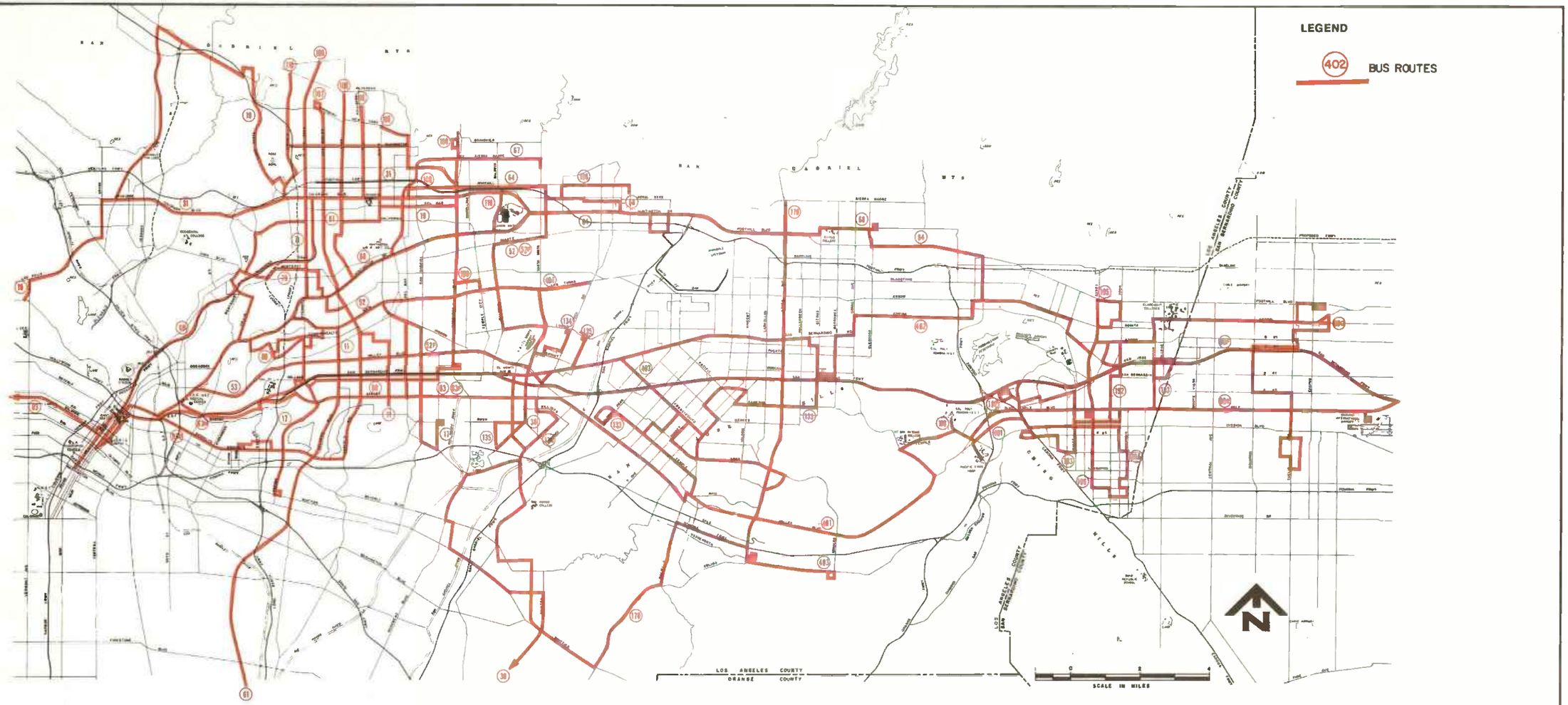
Nine transit routes presently utilize the San Bernardino Freeway Bus lanes to provide express freeway flyer service to Downtown Los Angeles. The basic express service and freeway flyer route operating characteristics and estimated 1975 average daily passengers are shown in Table 8.

Routes 52F and 53F provide express service from Los Angeles to Arcadia and El Monte respectively. A total of three peak hour runs are made by Lines 52F and 53F and carry an estimated 790 passengers per day. The 60 lines operating to Riverside and Pomona carry the largest volume of passengers per day. A total of 3,024 passengers are carried on the 36 runs made on the 60E and 60G Lines. The 63F Line which operates express from Los Angeles to El Monte has six peak hour runs and carries a total of 230 passengers daily from the Central Business District to El Monte.

The 401 and 402 Lines which operate from Wilshire Boulevard to the Central Business District to Azusa, the Eastland Shopping Center and Pomona are the next highest utilized lines of the express 84 routes. The 401 Route which has a total of 78 runs per day, carries an estimated 1,700 out-bound passengers per day while the 402 Line which provides service from the Wilshire Boulevard corridor through the Central Business District to the Eastland Shopping Center and Pomona, carries an estimated 1,900 daily riders. The 403, 404 and 405 Lines provide approximately 70 runs per day and carry an estimated 600 to 800 riders each day.

Hourly Operating Characteristics - A careful review of the hourly ridership characteristics of the San Gabriel Valley Express Lines indicates nearly 60 per cent of all travel outbound is accommodated in the two hour period - 4:00 P.M. to 6:00 P.M. As shown in Table 9 and illustrated in Figure 17, the heaviest riding occurs during the two hour period - 4:00 to 6:00 P.M. The heaviest hourly ridership occurs in the 4:00 to 5:00 P.M. peak period when the 402 Line carries approximately 395 outbound passengers from the Central Business District. The 60 Line has an estimated 356 riders during this one hour peak period, the 401 and 63 Lines carry 314 and 296 passengers, respectively.

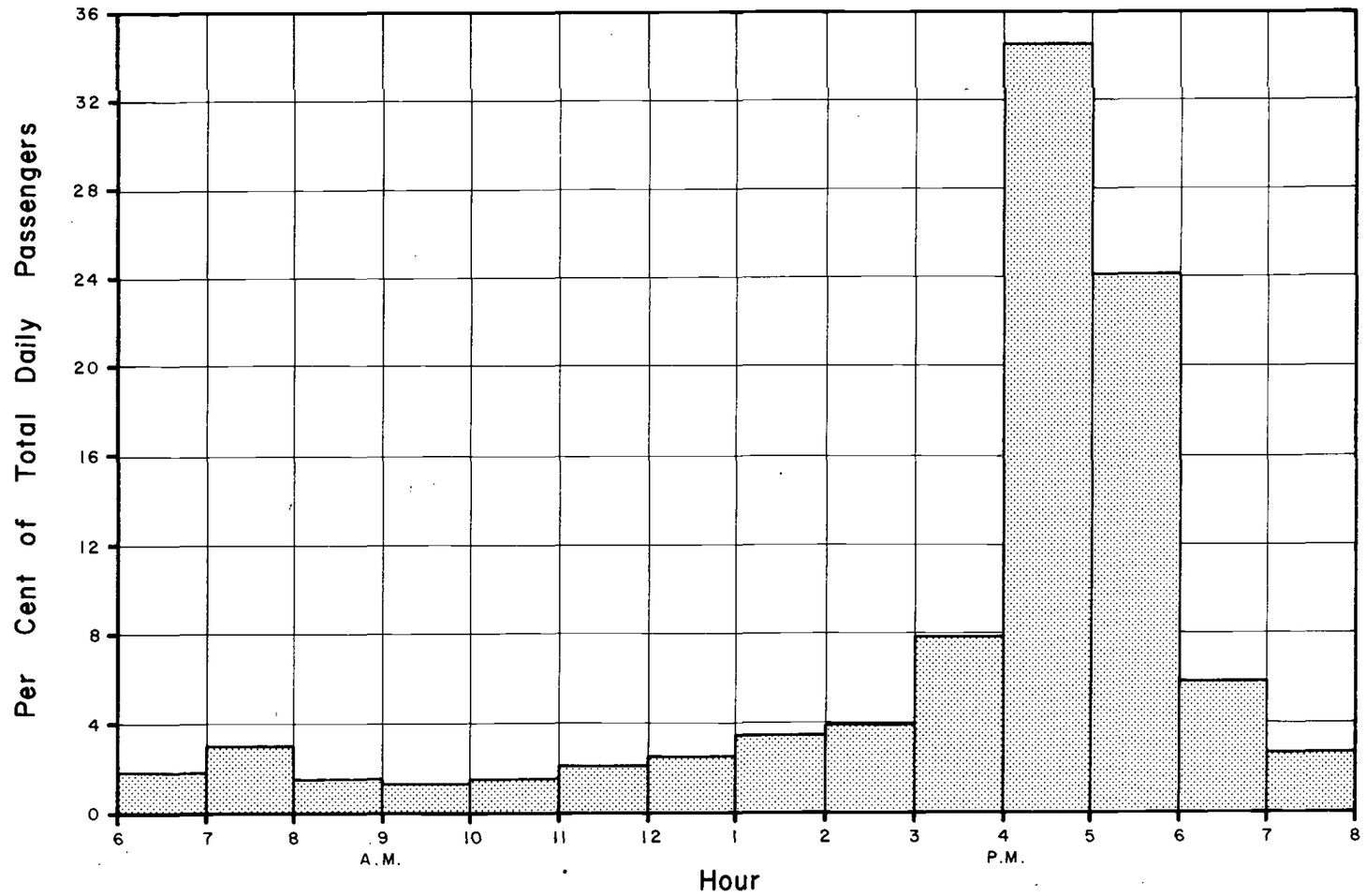
The San Gabriel Valley express lines carry an estimated total of 9,739 daily passengers with the outbound ridership accounting for approximately half of 4,667 passengers on a typical weekday.



EXISTING TRANSIT SYSTEM
SAN GABRIEL VALLEY

Wilbur Smith & Associates

Figure 16



HOURLY DISTRIBUTION OF EXPRESS BUS RIDERS
(Outbound)

Wilbur Smith and Associates

Figure 17

Table 8

OPERATING STATISTICS FOR EXPRESS ROUTES

San Gabriel Valley

ROUTE NUMBER	TERMINALS	OUTBOUND RUNS PER HOUR PEAK	BASE	NIGHT	SAT.	SUN.	TOTAL RUNS PER DAY	AVERAGE DAILY PASSENGERS
52F	L.A. to Arcadia	3	-	-	-	-	11	346
53F	L.A. to El Monte	3	-	-	-	-	7	443
60E/G	L.A. to Riverside	1	1	-	-	-	4	3,036
	L.A. to Pomona/Riverside	4	1	½	½	½	52	
63F	L.A. to El Monte	3	-	-	-	-	6	230
401	Wilshire to Pomona	1	1	½	1	½	34	1,702
	and Azusa Avenue	4	-	-	1	-	50	
402	Wilshire to Pomona	1	1	½	1	½	38	1,898
	and Eastland	6	-	-	1	-	50	
403	L.A. to Rowland Heights	4	2	2	2	-	80	665
404	L.A. to South Arcadia	4	2	2	2	-	70	852
405	L.A. to Temple City	5	2	2	2	-	70	567
						TOTAL	472	9,739

Local Route Service

A total of 28 lines are operated by the Southern California Rapid Transit District in the San Gabriel Valley which provide local service. Six lines provide radial service to the Central Business District of Los Angeles and 22 lines operate principally within the study area.

Routes 11 and 17 operate from East Los Angeles and provide service to the Rosemead and Monterey Park areas. The headways on these routes are 1 hour in the peak and base. Average running times for each of these routes is approximately 50 minutes. Route 11 carries an estimated 570 riders per day while Route 17 carries 428 passengers per day.

Route 19 provides service from Glendale to Pasadena and operates on a 30 minute headway during the peak hour and 60 minutes during the base. Route 19 is a 20.2 mile route and has a running time of approximately 80 minutes. A total of 876 passengers are carried on Route 19 on an average weekday.

Routes 38 and 61 provide service from Monterey Park in El Monte to Long Beach. Route 38 operates three times a day, while Route 61 provides service every 60 minutes. Route 38 has a scheduled time of 109 minutes and Route 61 has a running time of 90 minutes.

Table 9

HOURLY RIDERSHIP CHARACTERISTICS

San Gabriel Valley Express Lines
Outbound Service

LINE NO.	HOURS A.M. 6-7	7-8	8-9	9-10	10-11	11-12	P.M. 12-1	1-2	2-3	3-4	4-5	5-6	6-7	7-8	TOTAL DAILY ONE-WAY PASSENGERS
52F											56	118			174
53F										14	40	96			150
60E&G	34	86	46	41	42	58	80	88	90	111	356	271	88	82	1,512
63F											53	56			109
401	24	17	9	8	4	11	8	27	30	81	314	181	63	23	800
402	22	7	4	6	11	18	26	33	24	90	395	205	111	17	969
403											159	112			271
404		7	3	1	5	11	10	13	40	73	142	95	12		412
405	—	—	—	—	—	—	—	—	—	—	162	108	—	—	270
TOTAL	80	117	62	56	62	98	124	161	184	369	1,621	1,124	274	122	4,667
PER CENT	1.71	2.51	1.33	1.20	1.33	2.10	2.66	3.45	3.94	7.91	34.73	24.08	5.87	2.61	100.00

Routes 107, 108, 109, and 110 provide service in the Pasadena area. Route 107 has a peak-hour operation of 30 minutes while Route 109 has service every 15 minutes. Route 108 provides twenty minute headways.

The 22 basic routes operating within the San Gabriel Valley carry an estimated 16,266 passengers. A summary of the route characteristics of the local route lines within the San Gabriel Valley are shown in Table 10.

Six major routes within the San Gabriel Valley provide additional service to the Central Business District of Los Angeles. These long east-west radials provide an important service to the San Gabriel Valley. As shown in Table 11, Route 52, operating from Spring Street to Arcadia, provides service every 30 minutes in the peak hour and every 60 minutes in the base. This route carries an estimated 1,862 passengers each day and makes 82 trips. Line 53 operating from Olive Street to El Monte provides 88 trips a day operating with a 30 minute base period.

Table 10

OPERATION STATISTICS FOR LOCAL ROUTES

San Gabriel Valley

ROUTE NUMBER	TERMINAL	RUNS PER HOUR PEAK	BASE	NIGHT	SAT.	SUN.	TOTAL RUNS PER DAY	TOTAL PASSENGERS
11	East L.A. - South Rosemead	1	1	-	1	-	23	571
17	East L.A. - Monterey Park	1	1	-	1	-	23	428
19	Glendale - Pasadena	2	1				33	876
38	Long Beach - El Monte	-	4T	-	4T	4T	6	30
61	Long Beach-Monterey Park-Pasadena	1	1	2	1	2	29	458
64	Pomona - Pasadena	1T	2T	N/A	3T	N/A	8	150
67	L.A.-Spring St.-Sierra Madre	2	-	-	-	-	8	740
79	Alhambra-Rose Hill Park	1.25	1.25	-	1.25	-	37	90
80	Alhambra - El Sereno	2	1.66	-	-	-	50	272
107	Highland Park - Altadena	2	1.66	1.66	1.66	1	52	1,154
108	Pasadena - Colorado	3	3	1	1	1	96	1,971
109	Fair Oaks - Lake	4	3	1.66	2	1.66	104	3,168
110	Lincoln - Hill	3	3	1.66	2	1.66	60	2,330
119	Washington - Baldwin	2	2	2	2	1.66	66	350
133	La Puente - Eastland	1	1	N/A	1	N/A	24	251
134	Azusa - Peck Fawlett	1	1	N/A	N/A	N/A	28	175
135	Azusa - Crosswell S. El Monte	1	1	N/A	N/A	N/A	24	98
170	Azusa - Whittier	2	2	2	2	N/A	62	640
192	Academy-Cornelia Arrow or Grove	2	2	-	1.33	-	54	663
193	Westmont - San Jose	2	2	-	1.33	-	58	723
195	Garey-South Town-North	2	2	-	1.33	-	50	539
196	Town-South Valley-East	2	2	-	1.33		50	589
						TOTAL	995	16,266

Table 11

OPERATION STATISTICS FOR RADIAL ROUTES

San Gabriel Valley

ROUTE NUMBER	TERMINAL	RUNS PER HOUR PEAK	BASE	NIGHT	SAT.	SUN.	TOTAL RUNS PER DAY	TOTAL PASSENGERS
52	L.A. Spring St. - Arcadia	1	1	1	1.33	1	82	1,862
53	L.A. Olive St. - El Monte		2	1	2	1	88	2,061
63	L.A. - El Monte	3	1	1	1	1	96	2,114
71	L.A. Spring St. - Pasadena	3	2	1	1.66	1		2,892
	L.A. Spring St. - Glendora						70	
68	L.A. Spring St. - Monrovia	1.5	2	1.33	2	1.33	60	1,565
69	L.A. Spring St. - Rosemead	2	1	-	-	-	32	514
						TOTAL	428	11,008

This line carries an estimated 2,061 riders per day in 1974. Lines 68, 69, and 71 operate in Glendora, Monrovia, and Rosemead from Spring Street in Los Angeles. Line 68 to Monrovia has a base period of 30 minutes, although peak hour service is provided every 40 minutes. A total of 60 trips are made daily by the 68 lines. Route 69 operates 32 times daily, providing 30 minute peak hour service and 60 minute base service. Route 71 from downtown Los Angeles to Pasadena has 20 minute peak service and headways of thirty minutes during the base.

A total of 11,000 riders are carried by these six principal radial routes. A summary of the San Gabriel Valley transit routes, including Route Number, terminals, headways, hours of service, number of trips per day, peak hour load factors, schedule adherence information, length of line, and scheduled running time are contained in the appendix.

EQUIPMENT INVENTORY

SCRTD has divided its service area into twelve major regions (divisions). Division 9 which serves the San Gabriel Valley, has its headquarters in the El Monte Terminal.

A total of 255 buses are assigned to this division. However, 54 of these buses operate outside of the study area. Table 12, shows the number of vehicles assigned to each route and the inventory of the bus services available for weekdays.

Table 12

ASSIGNMENT OF BUSES
AT DIVISION 9
DAILY EXCEPT SATURDAY & SUNDAY

San Gabriel Valley

LINE	SCHEDULED					SERIES		2ND
NUMBER	A.M.	BASE	P.M.	ASSGD.	SPARES	10 - 30	40 - 60	CHOICE
11	2	2	2	3	1		3	-
17	2	2	2	2	-		2	-
38	1	1	1	1	-		1	6000
52	14	7	18	20	2	10	10	2300
53	21	5	22	24	2	16	8	-
60	19	7	19	21	2	6	15	-
61	4	4	4	4	-		4	-
63	16	5	16	18	2	9	9	-
64	1	1	1	1	-		1	6000
68	13	7	12	13	1	7	6	2300
69	3	2	3	3	-		3	-
108	6	6	6	7	1		7	-
133	2	2	2	2	-		2	-
134	2	2	2	2	-		2	-
135	1	1	1	1	-		1	-
192	3	3	3	3	-		3	22/42
193	3	3	3	4	1		4	22/40
195	5	5	6	7	1	7		40/42
401	18	7	16	17	1	14	3	-
402	16	7	16	17	1	15	2	-
403	12	3	11	12	1	7	5	-
404	8	4	9	9	-	8	1	-
405	9	2	9	10	1	7	3	-
TOTAL	181	88	184	201	19	106	95	

Chapter 3

Transit System Evaluation

The evaluation of an existing transit system and the development of a comprehensive transit improvement program requires the use of a set of criteria from which the basic and proposed system can be judged relative to stated goals and objectives. The evaluation factors, therefore, represent an important measure and critical element in the determination of a transit system's performance and efficiency of operation.

The evaluation factors for a transit system should represent the major areas of concern for an existing or potential transit passenger. The factors should also include measures of efficiency and cost relative to transit operations. These factors include revenue miles of passenger service, cost per mile of operation, route miles of operation, for the transit operator and the scheduled travel times, frequency of service, and route coverage for the transit passenger.

A series of evaluation criteria and attitudes relative to transit service were developed for the San Gabriel Valley. New travel data were synthesized and major patterns of work trips developed. Data relative to coverage of major employment centers, and the transit dependent population were developed and evaluated relative to stated goals and objectives and perceived performance criteria.

TRAVEL PATTERNS

The utilization of travel patterns for transportation planning within the Los Angeles area is usually accomplished by the data developed by the LARTS traffic forecasting and trip distribution models. This information based upon home interview surveys conducted in 1960 and 1967, has shown to produce valuable trip information material.

The LARTS information relative to the existing travel desires within the Los Angeles area was based upon estimates of 1965 population and employment locations. Projections of future travel within the study area were based upon forecast of growth and development within the various statistical areas of the Los Angeles metropolitan area.

The San Gabriel Valley has experienced significant changes in population and employment in the past ten years. Many of the current focal points of the San Gabriel Valley were not represented in either the 1965 socio-economic data used in the LARTS data nor the projected development patterns of 1980. Therefore, a synthesis of new travel patterns was developed for utilization in the San Gabriel Valley transit planning study. These new travel patterns were utilized in conjunction with the LARTS data to develop a travel matrix.

Data Input

The development of estimates of inter-zonal travel patterns consistent with the SCAG growth forecast of the area utilized the county "preferred model." According to these projections, the population of San Gabriel Valley will increase from 1,260,000 residents (1970 Census) to 1,274,000 residents by 1980. This represents an increase of approximately 14,000 residents during the 10 year period 1970 - 1980. Approximately half of this increase is forecast to be accomplished by 1975, which would indicate the present population of the San Gabriel Valley to be 1,267,000 residents.

No population growth was projected for the West San Gabriel Valley from 1970 to 1975 under the county preferred plan. In the East San Gabriel Valley, the additional 7,000 people by 1975 would represent a total growth of about 1.4 per cent, which would produce a growth of 0.8 per cent in the Pomona area. Overall 1975 population in the Valley has been forecast to increase by one half of one per cent.

Synthesis of Travel

Population and Employed Labor Force statistics were compiled from the 1970 census tract statistics for the San Gabriel Valley and related to the 1968 LARTS traffic zones. Similar data were obtained for Regional Statistical Areas and the rest of the Los Angeles Region (the 55 RSA's). These data which relate to the 1970 resident populations in each areal unit have been accepted as suitable for 1975 conditions according to the County Preferred Forecast.

Estimates have been prepared for the number of average weekday trips that residents would be expected to make in cars or transit vehicles, based on income levels in the San Gabriel traffic zones. Per capita tripmaking would range from as low as 1.5 trips per persons in the lowest income areas to 3.5 trips per capita in the zones with highest income. Overall, average daily tripmaking is estimated at approximately 2.8 trips per person per day for the Valley as a whole.*

A separate estimate has been made of daily work trips by the employed labor force in each traffic zone. Approximately 90 per cent of the workers can be expected to make trips each day by car or transit; however, about 15 per cent of the tripmakers do not report to work on the average weekday, due to annual leave, sick leave, or other reason, so that only about three-fourths of all workers in large metropolitan areas make work trips by vehicular modes on the average day (about 10 per cent of all workers are employed in their homes or are able to walk or bike to work).** Thus, with 75 per cent of the employed labor force making a round trip to work each day, resident workers account for 1.5 work trips each day, on the average. (Similarly, the average job generates 1.5 work trips each day by car or transit riders).

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* Trip rates related to incomes have been adapted from studies in several large metropolitan areas in the United States, as reported in Patterns of Car Ownership, Trip Generation and Trip Sharing in Urbanized Areas, prepared for U.S. DOT, BPR, by Wilbur Smith and Associates, 1968. Also see SCAG's "Draft Regional Transportation Plan: Towards a Balanced Transportation System" - January, 1975. Based on the 1967 O-D survey, average trip rates are projected at 3.2 to 3.5 trips per person - 12 to 15 per cent more than the above calculation.

** The proportion of work trips is verified, however (1.5 tr./job/day).

Approximately 38 per cent of the population in the San Gabriel Valley was employed at the time of the 1970 Census. Work trips, based on 1.5 daily trips per worker, thus accounted for about 20 per cent of all trips produced by Valley residents. While this appears high, compared to the 1967 O-D study, the 17.4 per cent of work trips in that study relates to average daily trips at 3.2/capita - when related to labor force and jobs, the 1.5 trip rate, therefore is verified.

The number of jobs has also been compiled by traffic zones in the San Gabriel Valley and for the RSA's as an essential input to the development of inter-area travel patterns. For the metropolitan area as a whole, the number of jobs has been set equal to the number of employed labor force residing in the Region. This ignores travel into and out of the metropolitan area by persons commuting to or from the Region; which would have practically no effect on the study. The number of worker trips attracted by the jobs in each sub-area is equal to 1.5 trips per job, as noted earlier, so that trip-ends at the work places are exactly equal to trip-ends for work at the places where people live.

WORK-TRIP TRAVEL DEMANDS

In order to develop a useful pattern of work travel flow in the study area, it was necessary to link the resident workers with their jobs. This procedure was accomplished by use of statistical probability analysis. Formulae have been prepared for this purpose, based on relationships established in other areas, or determined from the 1970 Census statistics for the Los Angeles SMSA.

Intra-Area Trips

Three parameters were utilized to develop intra-zonal work trips. These were (1) the number of resident workers (employed labor force) in the traffic zone (or RSA); (2) the number of jobs in the traffic zone; and (3) the total number of jobs within an eight-mile radius of the traffic zone or in all zones whose centroids fall within the eight-mile radius.

The number of resident workers and jobs in the zone is a rough measure of the physical size of the zone; the larger the number of jobs in the zone relative to the total number of jobs within eight miles, the more likely that resident workers will find employment within the zone. The eight-mile radius provides information on the most significant areas of job competition. (The number of jobs is only about two-thirds the number of employed labor force in the San Gabriel Valley. A considerable number of workers commute to jobs outside the Valley, and some non-residents enter the Valley to find work, the vast majority of Valley jobs are held by Valley residents. Most residents travel less than eight miles to work.)

Inter-area Trips

Data collected in the 1970 Census showed the number of residents in cities of over 50,000 population who worked in the city and the number who worked in each other city of 50,000 or more.* About two dozen incorporated communities of over 50,000 persons are situated in the Los Angeles SMSA, providing data on travel patterns to work which have been reduced to a statistical decay curve ("gravity" curve). This gravity curve was used to develop "first approximations" of work travel between all zone-pairs in the San Gabriel Valley and between Valley zones and the Statistical Areas outside. Wilbur Smith & Associates standard

* Journey to Work, Report No. PC(2) 6D, U.S. Census of Population, 1970.

trip distribution package was used to produce successive approximations and a final origin-destination trip table. The product is "person trips," with no recognition of mode used.

Input Materials for Preparation of Work Trip O-D Table

The following materials were prepared as inputs to the development of a synthetic origin-destination pattern of work travel to, from, and within the San Gabriel Valley, 1975:

List of area subdivisions in the Los Angeles SMSA:

- Traffic zones in the San Gabriel Valley,
- Regional Statistical Areas (RSA's) in the rest of the SMSA,

List of inter-area air-line distances (computed from rectangular coordinates supplied for zone centroids),

List of residents in the employed Labor Force in each area (from 1970 Census),

List of jobs in each area (1970 data from LARTS for San Gabriel Valley and 1975 data from SCAG for remainder of Los Angeles SMSA.), and

Three sets of equations or formulae which, when applied to the above data, will produce the work-trip O-D table.

WORK TRIP POTENTIAL

A final trip tabulation of origin-destination data showing the number of work trips to and from jobs in each zone and to and from homes in each zone was developed. The data incorporated the intra-zonal trips as well as inter-zonal information.

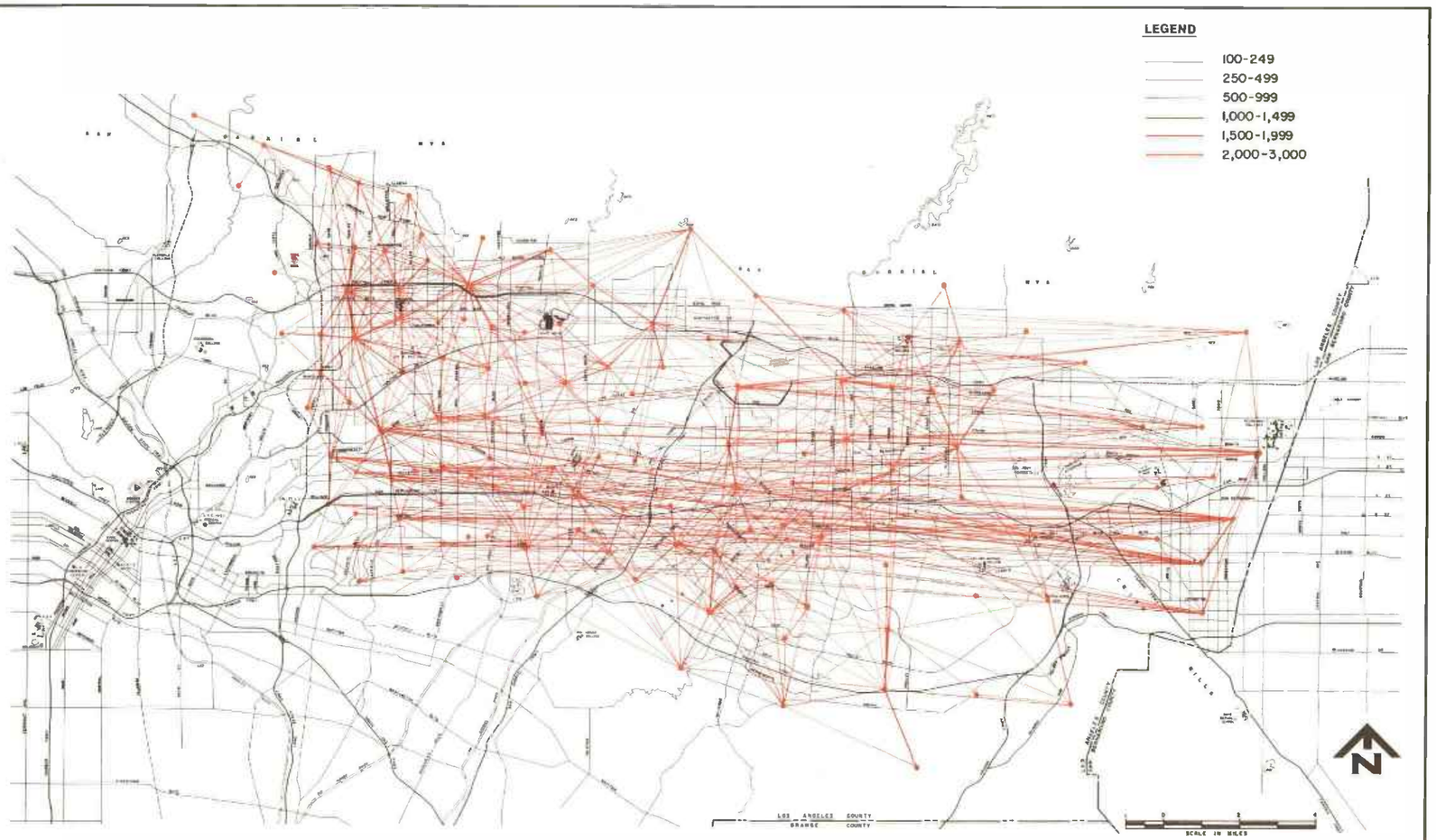
Two special types of analysis were undertaken utilizing the specially developed work trip travel data. This included a careful analysis of internal San Gabriel Valley work trips as well as an analysis of San Gabriel Valley trips to the Central Business District of Los Angeles.

San Gabriel Valley Work Trips

Special tabulations of zones producing high volumes of work trips were developed and related to existing transportation services. As shown in Figure 18 the predominant movement of work trips in the San Gabriel Valley is in an east-west direction. The major work trip travel patterns are from the residential areas of Pasadena and Alhambra to the major employment centers of El Monte, San Gabriel, and Baldwin Park. In addition, heavy work trip demands in the East San Gabriel Valley are noted between Pomona and Claremont to the West Covina and Covina area.

The West San Gabriel Valley has a relatively moderate range of north-south trips along the corridor from Monterey Park to Alhambra, South Pasadena, and Pasadena. A similar volume of north-south trips was recorded between the El Monte, Temple City, and San Gabriel areas. The West San Gabriel Valley has a high volume of north-south work trips in the Baldwin Park, West Covina, and Covina areas.

The Pomona Valley area of the East San Gabriel Valley has a very limited volume of north-south work trips, as almost all work trips in this area are directed to the west. A light volume of north-south travel was recorded in Pomona to Claremont and the La Verne area.



MAJOR WORK TRIP DESIRES

SAN GABRIEL VALLEY

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Figure 18

A total of 1,220,000 work trips are made daily in the San Gabriel Valley by an estimated labor force of 453,000. Approximately 900,000 of these trips have an origin and destination within the San Gabriel Valley while an estimated 300,000 trips are made daily to locations in Los Angeles County, Orange County, San Bernardino and Riverside County.

The Pomona Valley area produces the highest number of total trips to the Riverside and San Bernardino County areas with an estimated 26,000 daily trips being generated to and from Riverside and San Bernardino Counties. The majority of the Pomona Valley trips, however, are directed to the west, as an estimated 100,000 trips, or approximately 75 per cent of the total, have origins and destinations in the San Gabriel Valley and Los Angeles County area.

The work trip travel matrix for the San Gabriel Valley is shown in Table 13.

Central Business District Work Trips

A special summary of synthesized work trips for the San Gabriel Valley to the Los Angeles Central City was developed. This synthesis of travel was compared to the results of the recently completed Los Angeles Central Business District survey, which contained information relative to employee origins in a 365 block area.

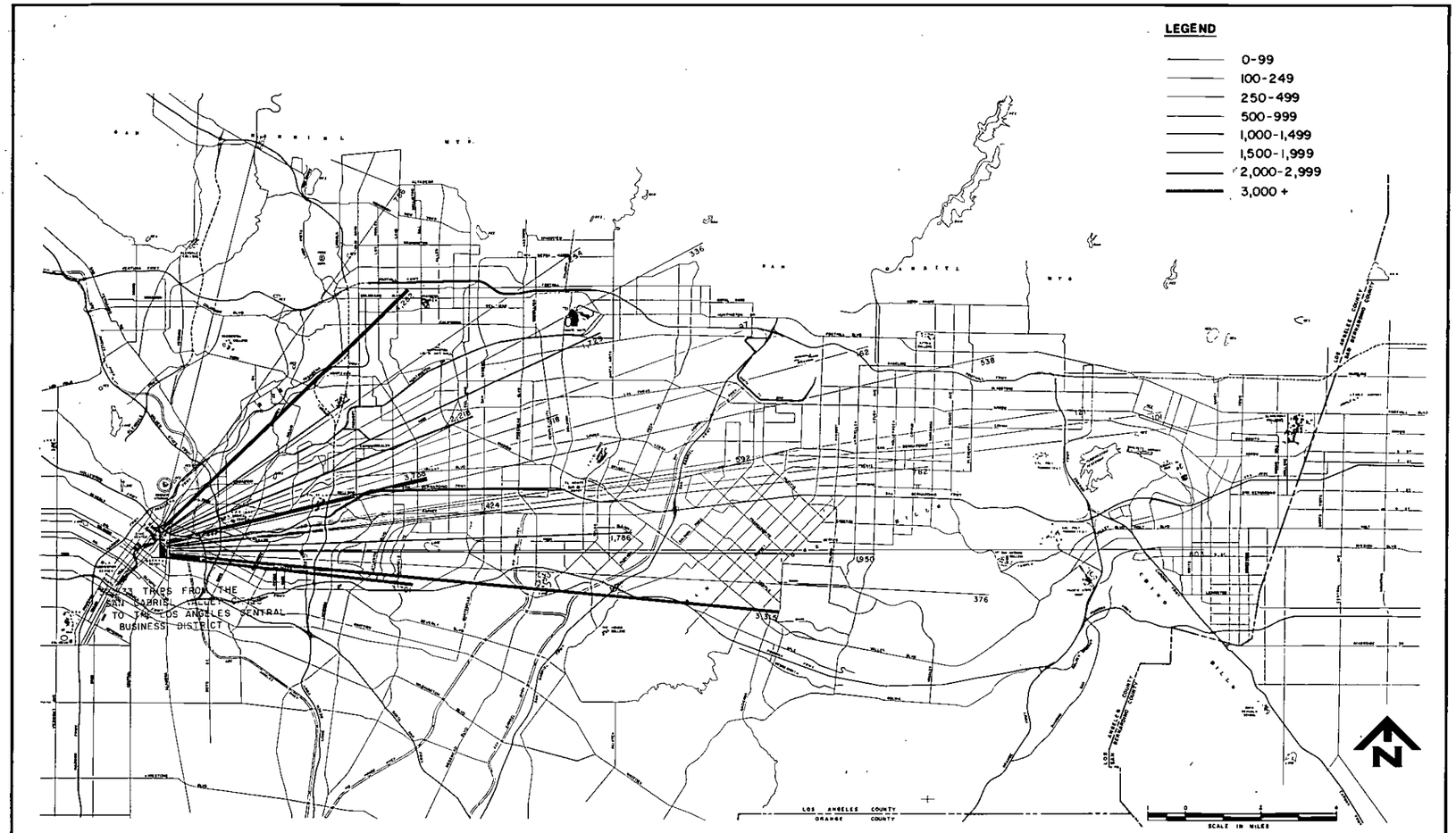
The work trips developed from the synthesis of travel are shown in Figure 19. A comparison of the synthesis of travel and the results of the O-D survey are tabulated in Table 14. Also shown are the number of work trips to the CBD per 1,000 residents.

Table 14

WORK TRIPS FROM SAN GABRIEL VALLEY CITIES TO LOS ANGELES CBD

San Gabriel Valley

CITY	SYNTHESIZED WORK TRIPS	SURVEY WORK TRIPS
Pomona	4,680	687
Alhambra	3,729	3,688
Monterey Park	3,387	3,225
Pasadena	3,349	4,629
Rosemead	2,238	1,481
El Monte	1,981	1,604
West Covina	1,824	1,869
So. Pasadena	1,517	1,761
Arcadia	1,475	1,840
San Gabriel	1,075	1,928
Covina	1,013	799
Monrovia	1,000	326
Baldwin Park	853	527
Claremont	787	141
Glendora	786	501
Temple City	694	938
Sierra Madre	473	263
Bradbury-Duarte	448	355
Azusa	442	151
So. El Monte	428	412
San Marino	398	225
San Dimas	393	120
La Verne	192	102
Irwindale	13	15
Remainder	1,200	3,356
TOTAL	34,375	31,699



WORK TRIPS FROM SAN GABRIEL VALLEY TO LOS ANGELES C.B.D.

SAN GABRIEL VALLEY

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Figure **19**

Table 13

WORK TRIP ORIGIN - DESTINATION
San Gabriel Valley

ORIGIN RESIDENCE	DESTINATION WORK ZONE									
	Pasadena	South Pasadena	Alhambra	Monterey Park	San Marino	San Gabriel	Rosemead	Sierra Madre	Arcadia	Temple City
Pasadena	22,499	1,360	1,455	211	1,271	642	263	250	662	645
So. Pasadena	2,894	878	2,164	77	104	103	34	7	26	28
Alhambra	2,677	1,259	3,828	1,354	235	777	140	16	88	119
Monterey Park	993	177	2,148	1,699	76	282	418	10	41	79
San Marino	3,628	128	82	34	1,241	320	40	13	45	65
San Gabriel	1,738	179	1,233	195	445	2,184	344	17	86	488
Rosemead	1,240	129	896	1,121	107	798	1,959	18	109	365
Sierra Madre	2,283	34	89	20	48	54	31	679	687	47
Arcadia	9,741	109	357	84	175	276	245	500	3,648	1,031
Temple City	2,933	60	597	132	262	1,330	1,277	54	928	2,377
El Monte	1,610	85	344	144	82	231	873	55	252	457
So. El Monte	176	17	87	50	13	47	125	3	20	35
Monrovia	1,423	51	148	42	53	77	67	169	511	102
Bradbury	321	14	41	13	12	21	20	18	78	24
Duarte	136	6	21	6	6	11	11	8	53	14
Irwindale	8	1	--	--	--	--	--	--	1	1
Baldwin Park	677	39	156	65	36	81	104	25	166	103
Azusa	589	31	94	31	25	43	46	23	109	47
Covina	636	37	118	46	26	53	58	22	102	54
West Covina	789	52	161	63	38	73	87	23	129	77
La Puente	418	29	98	46	21	48	64	11	66	46
Industry	182	15	46	22	7	20	25	4	20	17
Walnut	198	13	10	54	9	17	20	5	25	17
Glendora	555	30	121	27	23	47	36	22	93	35
San Dimas	436	18	68	19	20	42	50	18	241	106
La Verne	163	8	31	10	8	13	20	6	45	24
Pomona	1,317	312	3,940	1,423	92	283	202	17	81	79
Claremont	1,398	170	2,236	133	326	1,061	106	9	46	102
TOTAL	61,658	5,241	20,569	7,121	4,761	8,934	6,665	2,002	8,358	6,584

Table 13 continued

WORK TRIP ORIGIN - DESTINATION
San Gabriel Valley

ORIGIN RESIDENCE	DESTINATION WORK ZONE									
	Monrovia	Bradbury	Duarte	Irwindale	Baldwin Park	Azusa	Covina	West Covina	La Puente	Industry
Pasadena	416	19	45	87	187	113	77	74	109	209
So. Pasadena	25	3	3	6	20	8	2	8	10	26
Alhambra	78	4	10	22	79	30	51	21	44	89
Monterey Park	60	2	8	20	81	29	20	23	58	106
San Marino	34	1	4	8	19	9	6	6	12	17
San Gabriel	80	2	9	17	67	21	14	17	37	64
Rosemead	110	6	15	43	191	39	35	34	100	179
Sierra Madre	232	7	21	26	46	35	18	15	24	40
Arcadia	1,786	30	128	184	318	158	83	82	139	214
Temple City	489	13	51	121	323	89	56	65	130	201
El Monte	371	22	57	151	1,278	155	109	137	404	745
So. El Monte	28	1	5	12	94	12	11	12	43	82
Monrovia	3,702	97	520	289	215	273	102	80	100	164
Bradbury	468	330	177	184	124	557	80	47	55	75
Duarte	1,321	29	831	137	62	67	25	20	24	35
Irwindale	9	1	4	157	23	7	3	4	4	3
Baldwin Park	408	35	115	2,169	4,292	356	367	610	1,136	1,018
Azusa	376	108	106	409	393	5,805	1,608	440	250	391
Covina	289	39	76	372	627	1,740	6,172	1,545	531	837
West Covina	349	36	84	487	1,735	1,026	3,637	5,032	2,354	2,027
La Puente	137	11	27	141	2,354	182	280	846	5,281	5,332
Industry	45	2	10	28	225	57	81	119	692	3,196
Walnut	57	5	10	44	188	120	362	323	414	2,263
Glendora	238	41	54	180	263	2,412	2,718	402	214	418
San Dimas	726	17	130	324	370	99	52	59	86	120
La Verne	207	11	87	910	540	154	77	98	86	103
Pomona	204	18	53	1,092	347	467	293	1,029	151	243
Claremont	48	4	7	18	46	43	44	73	34	74
TOTAL	12,293	894	2,647	7,638	14,507	14,063	16,383	11,221	12,522	18,271

Table 13 continued

WORK TRIP ORIGIN - DESTINATION
San Gabriel Valley

ORIGIN / RESIDENCE	DESTINATION WORK ZONE								
	San Dimas	La Verne	Pomona	Claremont	El Monte	South El Monte	Walnut	Glendora	Total
Pasadena	31	29	1,133	376	831	308	32	39	33,371
So. Pasadena	2	2	635	218	73	48	4	4	7,412
Alhambra	8	9	8,444	141	262	293	8	13	20,099
Monterey Park	8	9	4,387	236	402	438	12	7	11,829
San Marino	3	3	166	178	37	56	1	2	6,158
San Gabriel	9	7	337	1,206	500	238	8	7	9,549
Rosemead	20	16	1,320	264	2,898	2,302	16	12	14,342
Sierra Madre	10	8	93	24	163	40	5	10	4,789
Arcadia	122	57	351	109	1,058	281	25	34	21,325
Temple City	86	55	530	294	2,697	581	31	22	15,784
El Monte	94	65	463	101	8,590	2,571	41	42	19,529
So. El Monte	6	6	126	20	238	3,711	6	2	4,988
Monrovia	78	71	206	41	542	133	27	62	9,345
Bradbury	20	33	79	12	148	41	17	51	3,060
Duarte	25	45	32	5	73	20	6	12	3,041
Irwindale	1	12	2	--	8	1	1	-	251
Baldwin Park	138	717	267	38	1,666	343	70	69	15,266
Azusa	32	116	346	28	347	117	116	1,698	13,724
Covina	33	123	753	45	436	168	573	1,088	16,599
West Covina	47	181	3,065	74	766	291	602	304	23,589
La Puente	23	53	259	26	629	255	184	52	16,919
Industry	6	13	141	11	203	103	141	20	5,451
Walnut	6	15	552	14	150	71	1,888	62	6,912
Glendora	22	48	625	43	298	107	198	2,672	11,942
San Dimas	506	106	97	22	658	102	13	20	4,525
La Verne	41	851	57	8	181	53	11	15	3,818
Pomona	27	92	5,966	812	394	262	78	93	19,367
Claremont	5	6	804	1,812	178	118	19	38	8,960
TOTAL	1,409	2,748	31,236	6,158	24,426	13,052	4,133	6,450	331,944

The Pasadena area produced the largest number of trips to the CBD of Los Angeles with 4,282 daily trips being recorded. The trip rate from Pasadena to the CBD of Los Angeles is relatively low, however, as only 92 trips per 1,000 workers are generated from Pasadena to the Los Angeles CBD. The cities with higher volumes of travel include Alhambra, Monterey Park, and San Gabriel, with 3,738, 3,701, and 2,218 work trips, respectively. The CBD travel demands produce trip rates on the average of 160 trips per 1,000 workers for these three areas. La Puente was estimated to have the highest number of trips per 1,000 workers than any of the other cities with 331 work trips for 1,000 workers. The high trip rate in La Puente is explained by the above-average number of white collar workers which work in the CBD, rather than the surrounding area of La Puente, which is mainly industrial.

The highest volumes of central business district trips generated in the E. San Gabriel Valley was West Covina with 1,950 trips, followed by Covina and Pomona. Pomona which has the longest travel time to the CBD of Los Angeles produces an estimated 800 trips per day.

A gravity curve of the San Gabriel Valley and the trips per 1,000 workers vs. the travel times in minutes was developed. This data is shown in comparison to the 1975 downtown employees survey. This gravity curve produced a good fit of all the cities except for La Puente.

The regression equation used for the curve is

$$Y = 3872.6X^{-1.32}$$

Where Y = attraction for 1,000 workers and,
X = travel time in minutes.

These data comparisons to the relatively small CBD of Los Angeles appears to validate the synthesis of travel for CBD work trips, as well as intra-valley work trips.

MAJOR GENERATORS

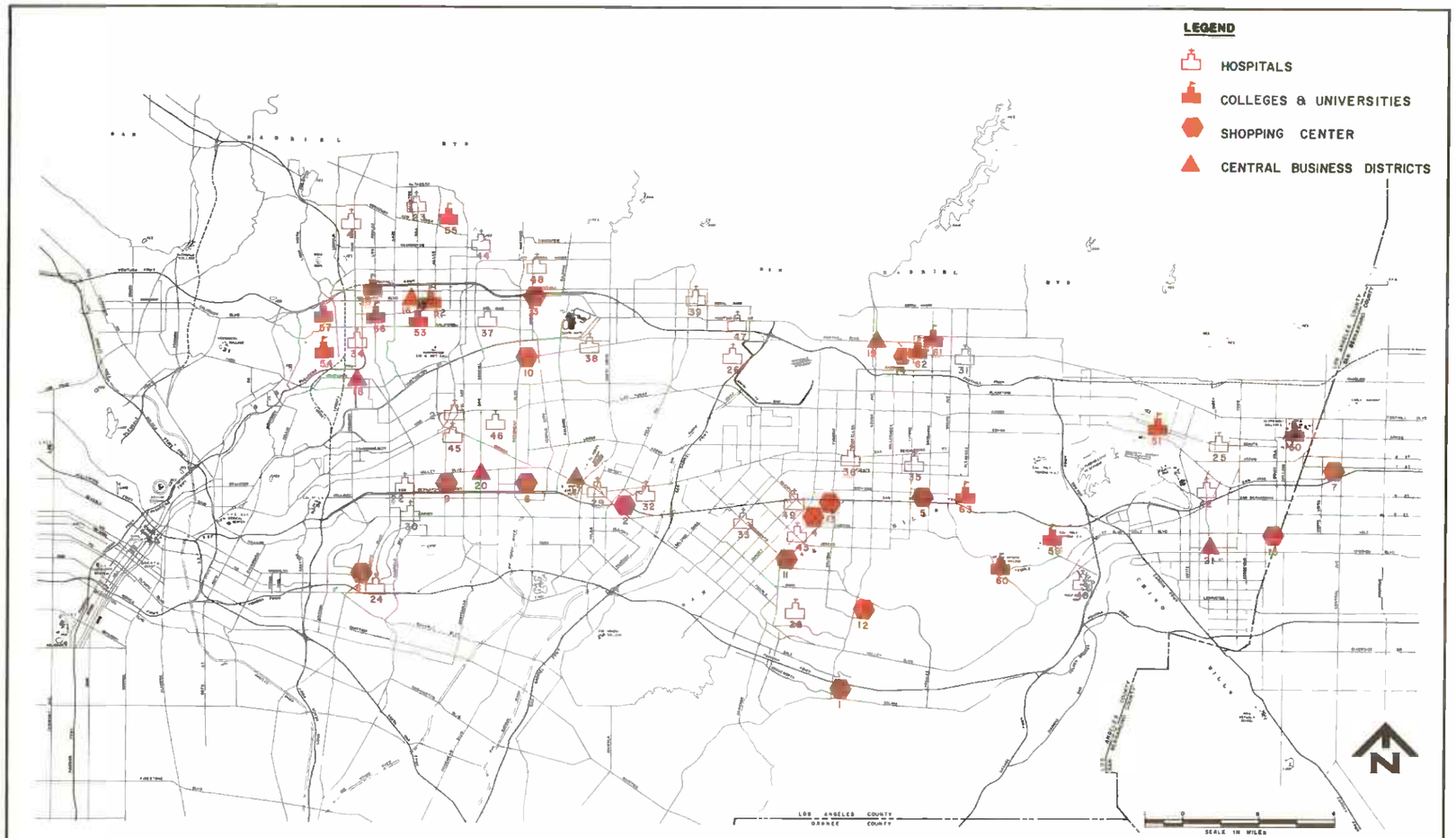
Certain activity centers exert a dominant influence on non-work travel patterns within a given urban area. These centers usually generate and/or attract person trips in a regular or predictable pattern. These major travel generators are considered in transit planning as they are centers that attract a high volume of passenger trips per day from a diverse area and can be economically served by transit. Major generators are usually classified as shopping centers, hospitals, schools, colleges and universities.

In addition, civic and social centers, where basic community and social services are provided, have been determined to be an important point in planning future transit services. Therefore, a series of inventories and analyses of the major travel generators in the San Gabriel Valley was undertaken.

The major travel generators in the San Gabriel Valley are shown in Figure 20 and tabulated in Table 15.

Shopping Centers

The San Gabriel Valley is served by a number of regional and community shopping centers. A total of four major regional shopping centers account for a majority of the total commercial square footage in the study area. The major regional shopping centers include the recently completed Puente Hills Mall, the Eastland Shopping Center, West Covina Shopping Center, the Pomona Valley Shopping Center, and the Rosemead and Montclair Shopping Centers.



MAJOR TRIP GENERATORS

SAN GABRIEL VALLEY

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Figure 20

Table 15

MAJOR TRIP GENERATORS

San Gabriel Valley

MAP NUMBER	GENERATOR	
	Shopping Centers	
1	Puente Hills Shopping Center	(C)
2	El Monte Shopping Center	(R)
3	Foothill - Rosemead Shopping Center	(R)
4	Fashion Square	(C)
5	Eastland Shopping Center	(R)
6	Rosemead Shopping Center	(R)
7	Montclair Shopping Center (1)	(R)
8	Atlantic Square Shopping Center	(C)
9	Valley Shopping Center	(C)
10	West Arcadia Shopping Center	(C)
11	South Hills Shopping Center	(C)
12	Woodside Village Shopping Center	(C)
13	West Covina Shopping Center	(R)
14	Foothill Shopping Center	(C)
15	Pomona Valley Shopping Center	(R)
	Central Business Districts	
16	Pasadena	
17	El Monte	
18	South Pasadena	
19	Azusa	
20	Rosemead	
21	Pomona	
	Hospitals	
22	Alhambra Community	
23	Altadena Community	
24	Bella Vista Community	
25	Casa Colina	
26	City of Hope	
27	Community Hospital of San Gabriel	
28	Doctors Hospital - San Gabriel	
29	El Monte Hospital	
30	Garfield Hospital	
31	Glendora Community Hospital	

MAP NUMBER	GENERATOR
	Hospitals
32	Grace Community
33	Hartland Hospital
34	Huntington Memorial Hospital
35	Inter-Community Hospital
36	Lark Ellen Hospital
37	Las Encinas Hospital
38	Methodist Hospital of S.C.
39	Monrovia Community
40	Pacific State
41	Pasadena Community
42	Pomona Valley Community
43	Queen of the Valley
44	St. Luke's
45	San Gabriel Community
46	San Gabriel Valley
47	Santa Feresita
48	Sierra Madre Community Hospital
49	West Covina Hospital
	Colleges and Universities
50	The Claremont Colleges
51	La Verne College
52	Pasadena City College
53	Calif. Institute of Technology
54	Pacific Oaks College
55	Pasadena College
56	Pasadena Playhouse Col. of Theatre Arts
57	Ambassador College
58	Fuller Theological Seminary
59	Calif. State Polytechnic College
60	Mt. San Antonio College
61	Citros Junior College
62	Pacific Bible College
63	Calif. Baptist Theological Seminary

(1) Located in San Bernardino County
(C) Community shopping center
(R) Regional shopping center

In addition, a number of community shopping centers are distributed throughout the region serving an important neighborhood shopping service. These include Fashion Square, the Atlantic Square Shopping Center, Valley Shopping Center, the West Arcadia Shopping Plaza and the Foothill Shopping Center.

Central Business Districts

The major central business districts which have significant concentrations of civic and social functions within the San Gabriel Valley include the Pasadena, El Monte, South Pasadena, Azusa and Rosemead Central Business in the West San Gabriel Valley. In the East San Gabriel Valley, the Pomona Central Business District is the largest single concentration of civic and social activities. The West Covina Civic Center is growing in importance within the commercial influence of the Central Business District.

San Dimas with a newly revitalized Civic Center is moving towards a greater concentration of community and civic activities.

Hospitals

A total of 28 major hospitals are located within the San Gabriel Valley. Pacific State Hospital, the City of Hope National Medical Center, the Huntington Memorial Hospital, and the USC Medical Center located on the western fringe of the San Gabriel Valley are the largest hospitals in terms of daily activity.

The Lark Ellen Hospital and the Los Ensenitas Hospital represent medium size hospitals within the study area. A number of community hospitals are established throughout the region and provide basic services for a limited population area. These community hospitals include the San Gabriel Valley, Sierra Madre, Pomona Valley, Pasadena and Monrovia hospitals.

Colleges and Universities

There are 15 major colleges and universities located in the San Gabriel Valley. These include the Claremont colleges, the California Institute of Technology, Pasadena City College, Mount San Antonio College and the Cal Poly College located in Pomona.

Estimated trip generation rates for each of these major areas were developed and a trip matrix relative to potential travel demand within each area prepared.

TRANSIT ATTITUDES AND EXPECTATIONS

To improve transit patronage, many non-transit riders must be diverted from the present mode of travel to buses. In order to determine the attitudes and expectations of San Gabriel Valley residents relative to public transportation, attitude and expectation surveys were undertaken. A technical and

a survey questionnaire was distributed to San Gabriel Valley residents by mail, handout and published in the various newspapers.

The main purpose of this survey was to determine what elements of the existing transit system should be improved to make public transportation more attractive. In addition, questions were asked relative to what new services would be most beneficial in attracting the existing automobile riders to transit. The results of the basic surveys are shown in Table 16. Most of the respondents from the ten major communities that participated in the study were from households which had two or more automobiles available for trip making.

The majority of the San Gabriel Valley residents responded that the element that was most important on the existing transit service was frequent bus service. Shorter walking distance was highlighted as the most important element in transit service by 22.7 per cent of the residents.

The present cost of bus service, a function of the 25 cent flat fare, was listed as a major element in their current choice to utilize transit. It is important to note that the cost of bus service was listed as the third most important element following frequency of service and convenience of service to the trip destination. Door-to-door service represented by dial-a-bus operations and fast bus service were least in order of importance to the majority of residents within the San Gabriel Valley. On-time bus service which represents adherence to schedules was indicated as the major element by 14.7 per cent of the total residents.

Additional attitude surveys have been undertaken in the San Gabriel Valley by Bigelow-Crane Associates

Table 16

PUBLIC TRANSPORTATION ELEMENTS THAT NEED IMPROVEMENT

San Gabriel Valley

TRANSIT ELEMENT	NUMBER OF VEHICLES IN HOUSEHOLD					TOTAL
	0	1	2	3	OVER 3	
			(Per Cent)			
Frequent Bus Service	1.7	6.4	10.9	3.0	1.6	23.6
Fast Bus Service	0.6	2.2	5.2	0.6	0.7	9.3
Short Walking Distance	1.4	6.6	11.0	3.2	0.5	22.7
Door-to-Door Service	0.5	2.8	3.2	1.0	0.5	8.0
On Time Bus Service	0.5	4.3	6.5	2.5	0.9	14.7
Cost of Bus Service	0.9	6.1	10.4	3.4	0.9	21.7
TOTAL	5.6	28.4	47.2	13.7	5.1	100.0

relative to the San Bernardino Freeway Busway. These surveys were conducted on riders utilizing the El Monte Terminal on a typical weekday. These results were tabulated to determine some of the characteristics of express transit riders.

Mode of Travel to and From Bus Stop

Table 17 shows the percentage of transit passengers that utilize various modes of travel to and from the bus stop. Over half, 55.4 per cent of the bus riders got to the bus stop from a parking lot at or near the location at which they boarded the bus. Of the total riders that drove their cars, 49.2 per cent parked their vehicles at the El Monte Station, 19.1 per cent at another lot, 15.3 per cent on the street, and 15.6 at various other unspecified places. Almost 16 per cent of the total transit riders were driven by someone to the bus stop (kiss-and-ride) and 4.3 per cent transferred from another bus.

Table 17

MODE OF TRAVEL TO AND FROM BUS STOP

El Monte Busway

MODE OF TRAVEL TO BUS STOP FROM ORIGIN?

MODE	NUMBER	PER CENT
Drove Car and Parked	468	55.4
Driven by Someone Else	134	15.9
Transferred from Another Bus	36	4.3
Walked	202	23.9
Taxi	0	0
Other	4	0.5
Subtotal	844	100.0
No Response	7	
TOTAL	851	

The majority of the bus passengers (83.6 per cent) walked to their final destination from the bus and 14.9 per cent transferred to another transit vehicle. (See Table 18.)

Table 18

MODE OF TRAVEL TO AND FROM BUS STOP

El Monte Busway

MODE OF TRAVEL FROM BUS STOP TO DESTINATION?

MODE	NUMBER	PER CENT
Drive Car Parked Near Bus Stop	6	0.7
Picked Up By Car	1	0.1
Take Another Bus	126	14.9
Taxi	0	0
Walk	707	83.6
Other	6	0.7
Subtotal	846	100.0
No Response	5	
TOTAL	851	

Trip Purpose

Table 19 shows the distribution of trips by purpose. Most of the trips (87.7 per cent) were work trips where nearly two-thirds originated at home. This information substantiates the concern and emphasis on developing a new set of work trip travel desires for utilization and analyses.

Businesses and school trips, 7.6 per cent and 2.4 per cent, respectively, composed only a tenth of the total trips. The remainder of the trip purpose represent a minor amount of transit trips within the Valley.

Table 19

TRANSIT TRIP PURPOSE

El Monte Busway

TRIP PURPOSE	NUMBER	PER CENT OF RESPONSES
Work	804	87.7
Business	70	7.6
Shopping	1	0.1
School or University	22	2.4
Social	1	0.1
Personal Service	7	0.8
Other	12	1.3
Subtotal	917	100.0
No Response	2	
TOTAL	919	

TRANSIT-DEPENDENT POPULATION

A careful analysis of transit needs and utilization by transit-dependent population groups was undertaken. These individuals represent a significant portion of total transit patronage as this is their primary means of transportation.

Analyses of transit use is generally based on the definition of two classes of bus patrons:

1. People who are captive to transit because they have no practical alternatives of accomplishing their travel demands, and

2. Persons who use transit by choice in the sense that they own a private car, have a driver's license, and therefore, are in a position to choose between bus and the automobile.

The choice riders use the bus if they perceive some advantage over the use of the car, economically due to the high cost of car operation or for some other reasons such as relief from driving, faster service or a combination of convenience, time and cost savings.

Captured riders are a diverse lot and the degree to which they are captive varies also with people. People without cars (households that do not have cars) are the most obvious. They are dependent upon taxi cabs and favors of friends with automobiles if there is no bus service. Buses are cheaper than taxis and make these riders to a large degree independent of friends and relatives. Under the current 25 cent flat fare within the Los Angeles area, these people can achieve considerable independence of movement by means of bus travel.

Other categories of bus captive populations include the elderly, who are no longer able to drive, handicapped persons who cannot qualify for a license and young individuals, not yet of driving age. In households with one car where the working head of the household uses the car to get to his place of work, other members of the family left during the day can be regarded as transit captives during the hours when the car is not available. Without bus service, the household has the choice of purchasing another car or depending upon taxis, friends and relatives when the car is not home.

Overall, nearly half of the urban population of the San Gabriel Valley is composed of individuals without driver's licenses. Many of these are children, of course, who make little travel independent of their parents. However, many of these young individuals are in the age group of 12 to 16 who are

very demanding of the time of the car operators in the household. Typically, twenty-five per cent or more of the trips made by members of large households represent chauffeuring travel by car drivers whose only function is to drive another person to and from a scene of activity in which the driver has no part. These trips are the "serve passenger" trips.

An adequate transit service should be able to relieve drivers from many of these trips. A record of transit use in most communities however, has not shown this to have occurred to any large extent.

Therefore, areas of the San Gabriel Valley where transit service would be utilized by a significant portion of the transit-dependent population were identified. This was accomplished by superimposing the various demographic characteristics representative of transit-dependent groups in each traffic zone. The identification of one or more heavy concentrations of individuals who would be dependent upon public transportation in a single zone, served to indicate a potential area for service.

Three major categories of transit-dependent persons were considered:

1. Those persons aged 65 and over,

2. Households with no vehicles available, and

3. Concentrations of individuals below certain income levels.

In addition, the County roles of aid to families with dependent children and location of heavy concentrations of welfare recipients were also utilized to identify transit-dependent population groups.

As expected, these groups overlapped to a large extent and are dispersed throughout the County. However, it appears that approximately 10 per cent of the San Gabriel Valley residents are dependent upon public transportation.

The largest proportion of these transit-dependent population groups were located in the Pasadena-Baldwin Park, El Monte, South El Monte areas. Population dependent groups were also located in Pomona and Alhambra and portions of Azusa. Areas such as Altadena, La Puente, Covina and West Covina and other relatively new residential areas showed minimum concentrations of transit-dependent population groups.

The proportion of persons who are too young to have driver's licenses range from 30 to 40 per cent. The population group of 65 years of age and over represents approximately 4 per cent of the total population. The East San Gabriel Valley has a much lower range of senior citizens and averages of 12 per cent are found in the West San Gabriel Valley. Fewer than 10 per cent of all households in the San Gabriel Valley are without cars compared to over 15 per cent in all of Los Angeles County. The lowest proportion of households with no automobiles available are the newly developed suburbs in the East San Gabriel Valley.

It is interesting to note that the proportion of households without cars that are located outside of the general area of transit coverage is very small, 3.5 per cent and it is nearly the same throughout all of the San Gabriel Valley. Obviously, people without cars deliberately locate in an area where bus service is provided.

TRANSIT OPERATING CHARACTERISTICS

The scheduled hours and daily miles of bus operations within the San Gabriel Valley have been examined through the period 1970 to 1975. During

the period, April 1970 to September 1975, the Southern California Rapid Transit District has increased their total scheduled hours of operation from 14,231 hours to 17,101 while increasing their daily bus miles from 180,277 in 1970 to 226,361 in 1975. The scheduled hours of operation have increased by 20.2 per cent while the daily bus miles have increased approximately 25.6 per cent in this five-year period. (See Table 20.)

In 1970, about 14.0 per cent of the weekday in bus service miles operated by SCRTD were performed on the routes in the San Gabriel Valley. In April, 1970, there was a total of 1,705 scheduled hours and 25,414 daily bus miles operated. By December, 1973, SCRTD was operating 2,268 scheduled hours in the San Gabriel Valley and 35,348 bus miles. In this four-year period, the percentage of RTD operations in the San Gabriel Valley increased from 11.8 per cent in April of 1970 to 14.0 per cent.

As shown in Table 21, the Southern California Rapid Transit District currently has 2,650 scheduled hours of operation and has over 41,495 daily bus miles in the San Gabriel Valley.

When the San Bernardino Busway was opened in October, 1973 new services were added which increased

Table 20

SCHEDULED HOURS AND VEHICLE MILES

Southern California Rapid Transit District

DATE	SCHEDULED HOURS	DAILY BUS MILES	PER CENT CHANGE SINCE 1970 HOURS	DBM
April, 1970	14,231	180,277		
April, 1971	14,270	182,731	+ 0.3	+ 1.4
April, 1972	14,759	187,958	+ 3.7	+ 4.3
April, 1973	15,382	196,040	+ 8.1	+ 8.7
June, 1973	15,308	195,468	+ 7.6	+ 8.4
Sept., 1973	16,101	207,139	+13.1	+15.2
Dec., 1973	16,163	208,691	+13.6	+15.8
April, 1974	16,149	209,166	+13.5	+16.0
June, 1974	16,015	209,166	+12.5	+16.0
Sept., 1974	17,101	226,361	+20.2	+25.6

Table 21

SCHEDULED HOURS AND VEHICLE MILES

San Gabriel Valley

DATE	SCHEDULED HOURS	DAILY BUS MILES	PER CENT CHANGE SINCE 1970 HOURS	PER CENT CHANGE SINCE 1970 DBM
April, 1970	1,705	25,414	-	0.0
April, 1971	1,725	26,011	-	+ 2.4
April, 1972	1,760	26,578	+ 3.2	+ 4.6
April, 1973	1,888	27,651	+11.0	+ 8.8
Dec., 1973	2,268	35,348	+33.0	+39.1
April, 1974	2,295	35,527	+36.6	+39.8
June, 1974	2,280	35,532	+33.7	+39.8
Sept., 1974	2,650	41,495	+52.5	+63.3

the daily bus miles of travel in the San Gabriel routes by 33 per cent. Daily bus miles operating on routes serving the San Gabriel Valley accounted for over 17 per cent of SCRTD's weekday operation.

Most of the added services were represented by the new 400 series routes which provided the bulk of services for the new busway. Since the 1973 opening, these new services have been increased by 25 per cent. An additional fleet has been assigned to other routes in the busway service area. Overall daily bus miles have increased more than 52 per cent over 1970 levels on routes that serve the San Gabriel Valley.

Weekend bus services however, have not been increased to the same degree as weekday travel. Although substantial amounts of new bus services have been added to Saturday and Sunday systems, they are still below weekday patterns. Systemwide, scheduled miles of bus operations on Saturday were increased by 16.7 per cent in the period April, 1970 to September, 1974. However, bus miles on routes serving the San Gabriel Valley increased nearly 30 per cent during the same period, again reflecting services added when the San Bernardino Busway was opened.

Saturday bus miles of operation average about 60 per cent of scheduled work day service throughout the system and along the San Gabriel Valley routes. Whereas Saturday services in the San Gabriel Valley increased more than for the SCRTD system as a whole, the reverse is true on Sunday operations. Systemwide bus miles increased by about the same proportion as on Sunday as on Saturday, but in the San Gabriel Valley, Sunday operations improved very little, reflecting possible low levels of customer demand. Sunday bus miles on the routes of the San Gabriel Valley are presently less than 32 per cent of the level of service provided on weekdays.

EVALUATION OF EXISTING TRANSIT SERVICE

The system was evaluated using the criteria relative to accessibility and coverage of transit-dependent population groups and the major travel generators in the study area. The operating characteristics were also analyzed and evaluated. The results of this evaluation were summarized on a community basis.

Accessibility and Coverage

The measure of accessibility and transit coverage adopted for this study is the service area within one-quarter mile of the transit route. This measure has been widely adopted within the transit industry as reflecting the maximum distance (1,300 ft.) that the majority of bus passengers are willing to walk to a bus stop. As used in this study, the measure does not take into account physical barriers that may affect accessibility to the bus route. The coverage provided by buses of the SCRTD was determined by superimposing a one-quarter-mile coverage band on the transit route system and assembling demographic data for the areas covered. This technique is useful in detecting areas that are not served by the existing transit system.

Access to the major generators provided by transit was analyzed by examining the proximity of the facility to transit routes providing service within a reasonable walking distance.

Service is provided to all of the major central business districts and all of the regional shopping centers are within four blocks of a transit line with the exception of the Foothill Shopping Center. It should be noted that the lines that serve Eastland, West Covina and El Monte Shopping Centers are limited type lines that are not inducive to the use by neighboring residents.

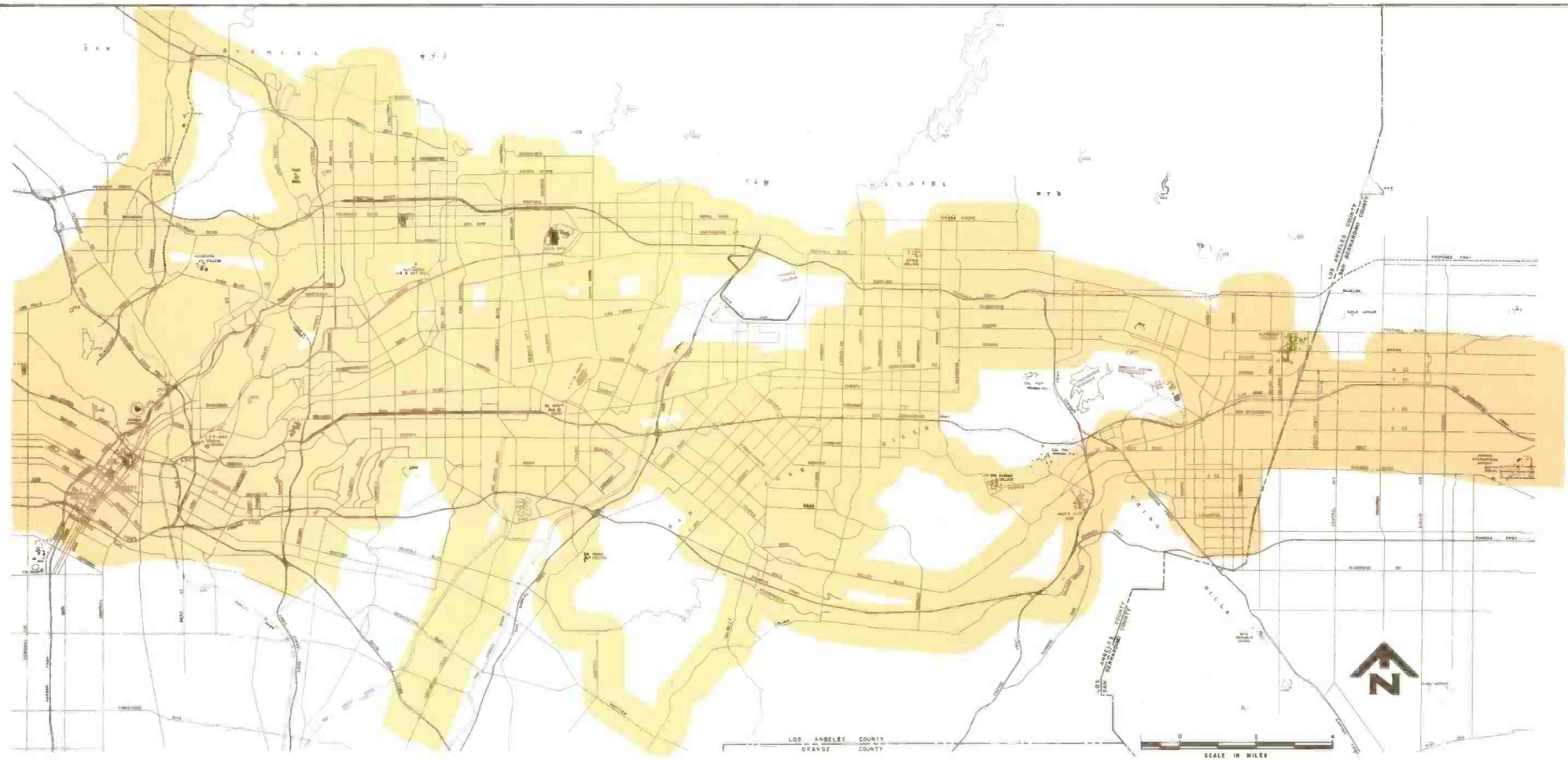
Transit service is not provided to all of the hospitals and medical centers in the area. The City of Hope National Medical Center and two community hospitals in the northern portion of Monrovia and in Glendora presently have no transit service. The Pacific State Hospital is also not located within the coverage area. With 1600 employees, transit has a good potential for serving these workers in addition to visitors.

Coverage

The one-quarter mile "coverage" band is shown in Figure 21, representing the areas served by transit. Overlapping, or intense coverage is illustrated where more than one route serves the same area. It is evident that the most intense coverage is in the areas of the Valley that were first developed--those nearest downtown Los Angeles and the older cities such as Pomona and Pasadena.

Thus, bus coverage is basically up to standard throughout most of Altadena, Pasadena, South Pasadena, Alhambra, San Gabriel, El Monte, Baldwin Park, Pomona and major portions of San Marino, Monterey Park, South San Gabriel, West Covina, La Puente and Monrovia. However, the lack of north-south connections between transit lines, a person who lives, works, or attends schools that are within the coverage band of a particular route does not necessarily have access to other areas served by transit. Thus, while some areas have adequate service, the remainder has far less coverage and poor route interconnections.

Much of the West San Gabriel Valley population has access to bus transit routes within a quarter-mile of the dwelling places. As shown in Table 22, based on quarter-mile "coverage" distances, nearly sixty-three per cent of the population lives within walking distance of bus routes. About 70 per cent of the San Gabriel-Alhambra populations, and over 80



TRANSIT COVERAGE AREA

SAN GABRIEL VALLEY

Table 22

POPULATION COVERAGE

San Gabriel Valley

CENTRAL CITY	RSA	NUMBER PERSONS	POPULATION SERVED	PER CENT
Pasadena	17	184,216	103,147	56
Arcadia	18	139,972	65,860	47
Alhambra	28	239,515	168.012	70
El Monte	29	112,174	82,843	74
All West San Gabriel	-	675,877	419,862	62
Covina	30	267,961	88,365	33
La Puente	36	179,198	78,623	44
All East San Gabriel	-	447,159	166,988	37
Pomona	31	136,797	88,046	64
Total San Gabriel Valley	-	1,259,833	674,896	54

per cent in the El Monte area live, within 1300 feet of bus stops, whereas the bus routes are more widely spaced in the less intensively settled portions of the Pasadena and Monrovia area.

Like the West San Gabriel Valley, Pomona with its longer history of settlement, has an extensive system of bus routes which provide quarter-mile coverage to about two-thirds of its residents.

The remainder of the East San Gabriel Valley experienced its greatest growth at a time when public transit was in decline and therefore, has never been very dependent on transit. A few east-west routes traverse the area, technically providing coverage of a little more than 37 per cent of the residential populations.

Analysis of the bus coverage provided by the existing transit system indicated that over 50 per cent of the labor force living in the San Gabriel Valley-Pomona area presently has bus service. (See Table 23.) This is also about equal to the proportion of the available jobs being served.

The transit-dependent population groups (the elderly, and no vehicle households) appear to be adequately covered by existing transit routes in Pasadena, Alhambra, Rosemead, and Pomona. Monrovia and La Verne have transit service in these areas but there are small areas that could be served with minor rerouting. Of particular note is Baldwin Park. This area has a high density population, is very poor, and has few automobiles but is not presently served by the existing system. As shown in

Table 23

TRANSIT COVERAGE OF LABOR FORCE AND JOBS

San Gabriel Valley

CENTRAL CITY	RSA	NUMBER PERSONS	PERSONS IN LABOR FORCE	LABOR FORCE WITH BUS SERVICE	PER CENT WITH BUS SERVICE	NUMBER JOBS	JOB WITH SERVICE	PER CENT WITH BUS
Pasadena	17	184,216	79,485	56,586	71	103,280	92,770	86
Arcadia	18	139,972	58,375	28,786	49	37,310	22,547	60
Alhambra	28	239,515	102,600	80,412	78	68,188	52,130	76
El Monte	29	112,174	46,275	32,527	70	54,674	40,892	75
All West. San Gabriel	-	675,877	286,735	198,311	69	268,452	208,339	78
Covina	30	267,961	107,687	36,215	34	69,695	12,973	19
La Puente	36	179,198	63,480	27,809	44	70,457	22,718	32
All East San Gabriel		447,159	171,167	64,024	37	140,152	35,671	25
Pomona	31	136,797	49,517	31,644	64	56,931	18,140	32
Total San Gabriel Valley	-	1,259,833	507,419	293,979	58	465,535	262,170	56

Table 24, over the entire study area, 65 per cent of the elderly live within the transit coverage area. The least coverage is provided in the Azusa, Covina, Baldwin Park, and Glendora area with only 37.1 per cent of the elderly served.

Of the no vehicle households, approximately 75 per cent have adequate transit service. The autoless households are in the same general areas as the elderly and poor, since many of these people are poor and/or no longer drive. (See Table 25.)

Frequency of Service

Route coverage is not an adequate measure of bus service to a community unless bus frequency, hours of operation and adherence to schedules are satisfactory. Also, the routes must be sufficiently interconnected to give reasonably direct access between all parts of the area, and route alignments must maintain continuity with a minimum of indirection and deviation. Studies have shown that transit usage declines drastically when headways are longer than 20 minutes.[1] Most of the bus routes in the San Gabriel Valley operate at one-hour or greater headways during the off-peak hour. Some of these lines traverse areas of low income and low vehicle

[1] Institute of Traffic Engineers, Change of Mode Parking, January, 1973, p. 10.

Table 24

TRANSIT COVERAGE OF AGE GROUPS

San Gabriel Valley

CENTRAL CITY	RSA	NUMBER PERSONS	*PERSONS* UNDER 16 YEARS	*WITH* BUS SERVICE	*PER CENT* WITH BUS SERVICE	*PERSONS* OVER 65	*WITH* BUS SERVICE	*PER CENT* WITH BUS SERVICE
Pasadena	17	184,216	50,143	31,059	62	26,948	20,096	75
Arcadia	18	139,972	40,709	18,276	45	15,353	8,683	57
Alhambra	28	239,515	63,610	45,161	71	28,117	21,566	77
El Monte	29	112,174	40,810	28,615	70	9,264	6,729	73
All West San Gabriel	-	675,877	195,272	123,111	63	79,682	57,074	72
Covina	30	267,961	101,144	30,744	30	14,699	5,450	37
La Puente	36	179,198	81,192	36,393	45	4,172	2,006	48
All East San Gabriel	-	447,159	182,336	67,137	37	18,871	7,456	40
Pomona	31	136,797	48,134	29,497	61	12,752	8,359	66
Total San Gabriel Valley	-	1,259,833	425,742	219,745	52	111,305	72,889	65

Table 25

TRANSIT COVERAGE OF NO VEHICLE HOUSEHOLDS

San Gabriel Valley

CENTRAL CITY	RSA	NUMBER PERSONS	NUMBER OF HOUSEHOLDS	HOUSEHOLD WITH NO VEHICLES	PER CENT HOUSEHOLD WITH NO VEHICLES	HOUSEHOLDS WITH NO VEHICLES SERVED	PER CENT HOUSEHOLDS WITH NO VEHICLES SERVED
Pasadena	17	184,216	59,310	10,408	18	9,126	88
Arcadia	18	139,972	46,079	3,917	9	2,356	60
Alhambra	28	239,515	82,857	8,335	10	6,918	83
El Monte	29	112,174	36,942	4,205	11	3,193	76
All West San Gabriel	-	675,877	225,188	26,865	12	21,593	80
Covina	30	267,961	75,638	4,383	6	1,772	40
La Puente	36	179,198	42,066	1,201	3	729	61
All East San Gabriel	-	447,159	117,704	5,584	5	2,501	45
Pomona	31	136,797	39,951	3,888	10	2,730	70
Total San Gabriel Valley	-	1,259,833	382,843	36,337	9	26,824	74

ownership where it is logical to suspect that increased service would generate additional transit usage.

In the areas covered by transit, service frequencies range from a basic 1-hour midday operation on routes with lowest service levels to service at 10 to 15-minute intervals on routes in some of the more densely settled older areas at the western end of the Valley. Peak-period services are generally 30-minutes or better, with buses operating every 10-minutes or less on some main routes. Figure 22, illustrates the typical scheduled frequency of buses on each route at peak and off-peak conditions.

North-South Connections

The geography of the San Gabriel Valley is inducive to the development of transit routes that run east-west from Los Angeles to the outlying communities. However, there are currently no north-south connections to facilitate movement between these communities except for the older and more dense areas. SCRTD has recognized this deficiency and has proposed a grid system. However, this proposed grid system lacks sufficient coverage to be effective as the north-south lines are spaced at approximately 2-mile intervals which means that potential transit riders would have to walk at least a mile to the nearest bus lines.

Schedule Adherence

The ability of a bus to adhere to prescribed schedule times is an important factor in operating a reliable transit service. Bus riders who are forced to wait unnecessarily or miss a bus due to unreliable schedule adherence by drivers soon become dissatisfied and seek other modes of travel.

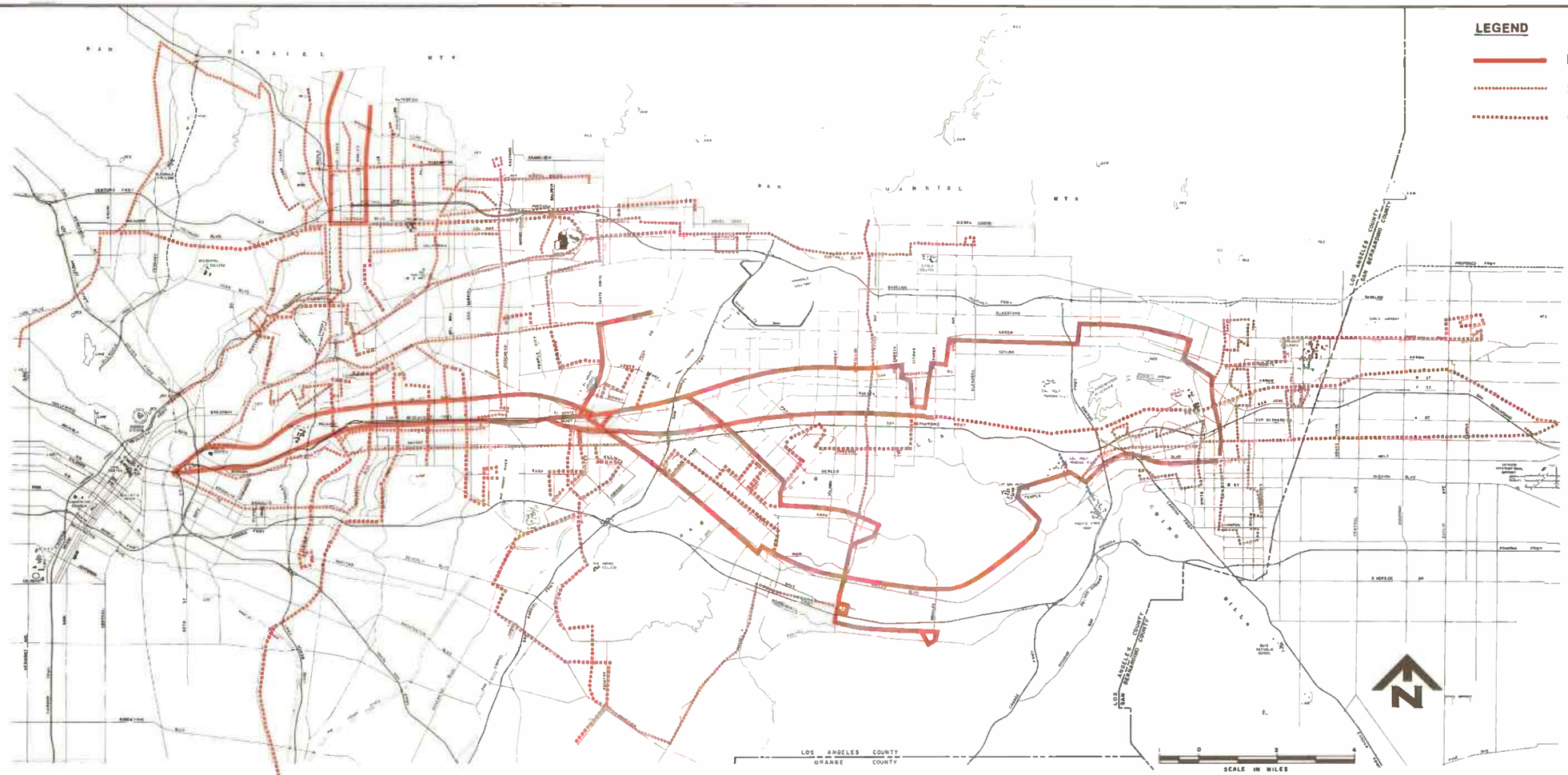
Table 26 presents an analysis of the time by which a bus is on schedule according to schedule adherence checks conducted by RTD at the El Monte Station of buses using the San Bernardino Freeway. These data were then plotted in Figure 23. As can be seen, 56 per cent of the scheduled vehicles are within 3 minutes of their scheduled times.

Table 26

SCHEDULE ADHERENCE CHECK AT EL MONTE STATION

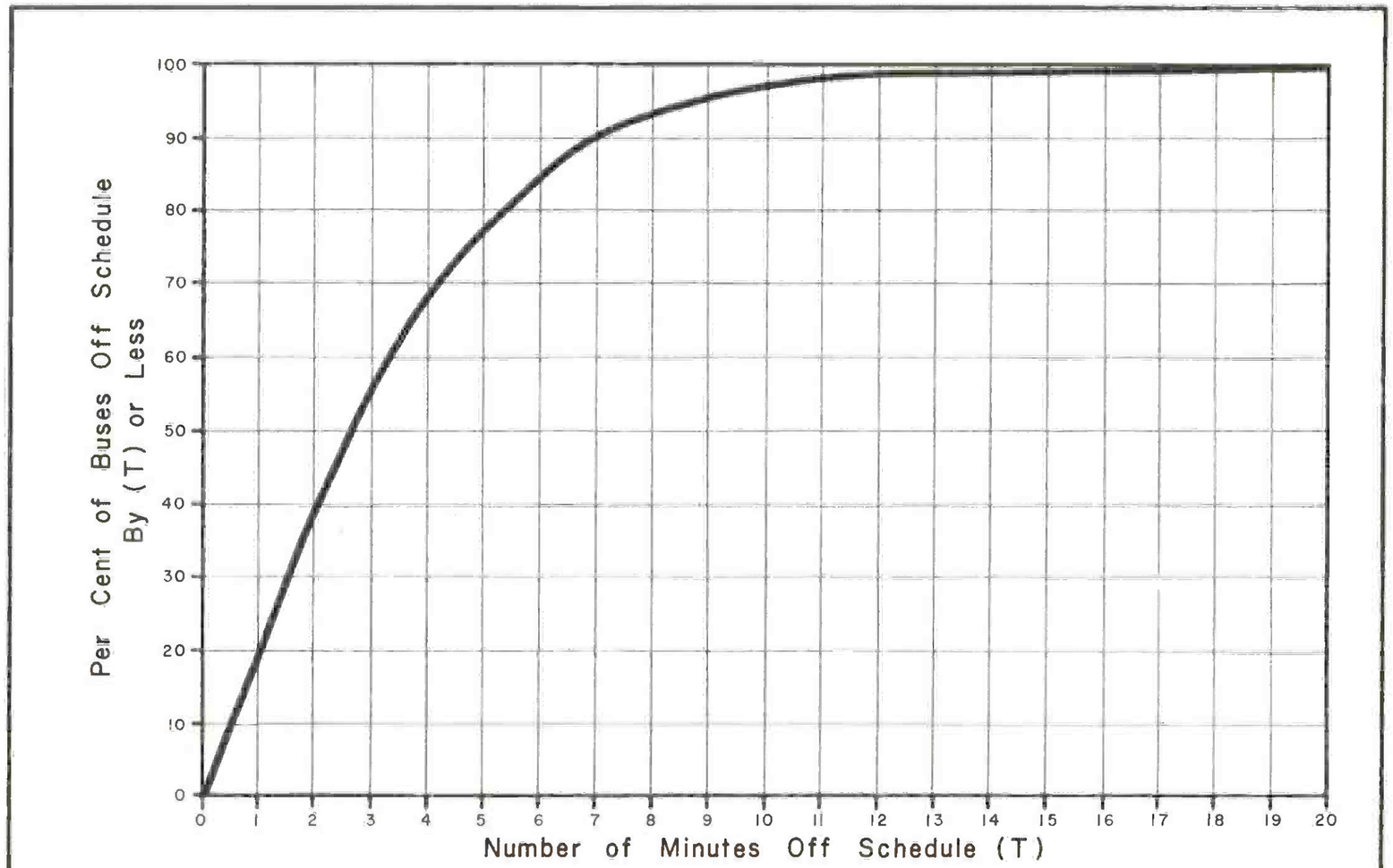
San Gabriel Valley

NUMBER OF MINUTES OFF-SCHEDULE (T)	NUMBER OF BUSES	PER CENT OF TOTAL	PER CENT OF BUSES OFF-SCHEDULE BY (T) OR LESS
0	43	18.8	0.0
1	44	19.2	18.8
2	43	18.8	38.0
3	28	12.2	56.8
4	20	8.8	69.0
5	16	7.0	77.8
6	15	6.6	84.8
7	3	1.3	91.4
8	5	2.2	92.7
9	6	2.6	94.9
10	1	0.4	97.5
11	3	1.3	97.9
12	0	0	99.2
13	1	0.4	99.2
14	0	0	99.6
15	0	0	99.6
16	0	0	99.6
17	0	0	99.6
18	1	0.4	99.6
19	0	0	100.0
20	0	0	100.0
TOTAL	229	100.0	



SCHEDULED FREQUENCIES

SAN GABRIEL VALLEY



SCHEDULE ADHERENCE

At El Monte Station

Wilbur Smith and Associates

Figure 23

INDIVIDUAL ROUTE EVALUATION

In order to develop a complete and comprehensive evaluation of transit service in the San Gabriel Valley, each individual route of the existing transit system was analyzed. The transit evaluation was undertaken in order to determine operational deficiencies and the level of service being provided to those areas with the most critical need for transit service.

Lines 11-17

These routes were originally designed as crosstown lines but they are presently not serving this function because they connect only adjacent towns. They do not extend to any major generators in the towns of San Gabriel and Rosemead.

Line 19

The slow travel speed along this route could be improved by use of Del Mar to the Jet Propulsion Laboratory which is the only major generator along its route.

Line 31

This line attempts to function both as a crosstown and a local line in Pasadena. These loops and turn-arounds result in numerous lines that "back track" on itself. These loops should be eliminated and the function of the line delineated.

Line 38

This line has been rerouted to conform with the Mid-Cities Transit Plan.

Line 53

This line does not provide frequent enough service to Los Angeles via the Busway. There are presently only three runs per day during the peak hour.

Line 60

The numbering on this line is confusing to patrons. The routing at its origin (the RTD station) needs improvement as the present alignment wastes much time just getting out of Los Angeles.

Line 61

Since this line is a crosstown connector, the running time and frequency should be improved from one run per hour to three.

Line 63

The dual lines exiting Los Angeles should be separated into two separate lines since the present alignment creates long travel times.

Line 64

This line is characterized by infrequent service (4 runs per day), slow travel time and indirect routing.

Line 67

This line shuttles persons between Sierra Madre and Los Angeles, but the travel time is too long to be attractive to bus patrons. This route has the same problem as Line 60 -- long delay in getting from the RTD station and out of the city.

Line 68

The indirect alignment of this route should be straightened out as the loops cause slow travel times.

Line 69

The loops in this line should be eliminated to improve the directness of the alignment.

Lines 70-71

These routes should be rerouted onto the Pasadena Freeway to create a semi-express service from Pasadena to Los Angeles.

Lines 133, 134, 135

These lines weave and loop Covina, West Covina and El Monte. They are attempting to cover too much area, resulting in indirect routing and slow service.

Lines 192, 193, 195, 196

These lines are locals in the Pomona area. However, they provide no crosstown service or service to adjacent towns. The infrequent service to the major generators--Cal Poly, Pacific State Hospital, and Mt. San Antonio College should be improved.

SUMMARY

A summary of the evaluation of existing transit service was developed utilizing the basic transit service criteria. This included an analysis of the responsiveness of existing transit system to the travel desires of the residents of the San Gabriel Valley, as well as evaluation of transit operating efficiency and service levels.

The evaluation of the responsiveness of the current system to existing and projected travel desires included an analysis of transit service for work trip travel as well as service to major generators throughout the San Gabriel Valley. Transit service to the transit-dependent populations of the San Gabriel Valley was also carefully evaluated.

Fifty-two per cent of the Valley's inhabitants live within the areas covered by transit (assuming uniform density throughout the census tract). Over 65 per cent of the elderly and 74 per cent of the Valley's autoless households are residing within the coverage area of the existing transit system. The major employment and business centers and residential areas are served. The level of service provided the individual cities in the Valley is summarized in Table 27 based on a subjective interpretation of demographic and operational factors.

The Alhambra-San Gabriel-Rosemead area and the Pomona-Claremont area have relatively good transit service. These areas have a system of local routes that circulate throughout that particular area, but there is an obvious lack of transfer points for Pomona residents to reach major generators in the study area. Coverage in these areas indicate that over half of the transit-dependent population is served.

Pasadena, Altadena - Twelve transit routes operate in this area. Headways are all less than 40 minutes. Nearly all the area is within the one-quarter mile coverage band, and north-south linkage is good. The local lines that operate in Pasadena do not circulate within the city making local transit travel difficult on a single line, but there are numerous transfer points.

Table 27

SUMMARY OF TRANSIT SERVICE

San Gabriel Valley

STAT. AREA NO.	CITIES IN RSA	N.-S. SERV.	E.-W. SERV.	FREQ. OF SERV.	AVAIL. OF LOCAL SERV.	AVAIL. OF THRU-SERV.	COV. OF EMPLOYMT.	COV. OF RESID.	COV. OF T-D POP.	LINK. OF MAJ. GENER.	COV. OF COMMER. AREAS
17	Altadena Pasadena	Good	Good	Good	Good	Aver.	Good	Good	Good	Good	Good
18	Arcadia Monrovia Sierra Madre Duarte Temple	Poor	Good	Poor	Poor	Poor	Poor	Good	Aver.	Aver.	Good
28	Alhambra San Gab. Monterey Rosemead	Good	Good	Good	Good	Good	Good	Good	Aver.	Good	Good
29	El Monte S. El Monte	Aver.	Good	Good	Aver.	Poor	Good	Aver.	Good	Good	Aver.
30	Azusa Covina W. Covina Glendora Baldwin P.	Poor	Aver.	Good	Poor	Aver.	Poor	Aver.	Aver.	Poor	Good
31	Pomona Claremont La Verne San Dimas	Poor	Aver.	Aver.	Good	Poor	Aver.	Aver.	Good	Poor	Good
36	Walnut Industry La Puente	Poor	Poor	Poor	Poor	Aver.	Poor	Poor	Good	Poor	Poor

South Pasadena, San Marino, Alhambra, San Gabriel, Rosemead and Monterey Park - Nineteen lines operate in this area. Alhambra, Rosemead, and the Western half of Monterey Park are well covered. San Marino, San Gabriel and the remainder of Monterey Park have areas that are not presently served. However, all major generators and schools are located within the one-quarter mile coverage band.

Arcadia, Monrovia, Sierra Madre, Duarte and Temple City - Temple City is relatively well served. The remainder of the cities have good east-west connections, however, there are no north-south services except for the 52 Line which is indirect and necessitates a transfer. Frequency and local circulation is poor. Bradbury has no transit service at all and one of the major generators, the City of Hope National Medical Center in Duarte, is not served.

El Monte-South El Monte - This area is well covered but the operational characteristics of the lines within the area do not permit travel to any major trip attractor other than the El Monte Shopping Center. The eleven lines that operate in this area are oriented east-west except for Lines 134 and 135. The 401-405, 60, 53 and 63 run express from Los Angeles to the El Monte Station. The remaining lines are locals.

Covina-West Covina-Baldwin Park have areas of transit usage potential but are not covered. There is a lack of local service and coverage of the major generators and employment centers. Azusa and Glendora have little transit service relative to the more developed areas. There is only one east-west route and one north-south route in Azusa. There is no local service.

Walnut-Industry-La Puente areas have the lowest level of transit service in the Valley. This is mainly the result of the topography of the majority of the area. The percentage of coverage to the transit-dependent population is good, but this represents such a small number of persons that it would not realize a return on the effort to provide service. The existing routes in La Puente is indirectly routed making travel times very slow.

Pomona-Claremont-La Verne-San Dimas - Pomona is well covered by the local system composed of Lines 192, 193, 195 and 196 which operate at frequent headways. However, interurban travel necessitate transfers and there are not many transfer points. Also, travel between major generators (Claremont Colleges and Pacific State Hospital) is difficult. North-south travel for La Verne and San Dimas are difficult. The only lines serving these two towns are the 64 and 402 which run infrequently and at a slow speed, since there are many stops.

Chapter 4

Transit System Planning

A series of transit improvements will be required in the San Gabriel Valley to better serve current transit patrons, improve resident mobility and to provide a viable alternative mode of travel. A comprehensive transit program will be necessary to meet the expanding urban economy and continued growth of intra-urban and inter-urban travel in the San Gabriel Valley.

The planning of these improvements must be carefully developed through a systems' approach which recognizes and evaluates individual community requirements in terms of regional travel demands. Transit system planning therefore, sets forth planning principles and concepts and evaluates a variety of alternative concepts in terms of regional goals and objectives. The transit requirements of the San Gabriel Valley are too complex to allow for continued expansion and development of new routes purely on a local basis.

Transit system planning therefore, should reflect a careful balance and interaction among regional travel desires, local service requirements and transit system capabilities. Effective transit system planning can produce plans which are innovative yet meaningful and practical; imaginatave yet implementable. Transit system planning recognizes the need to balance transportation concepts with reality and future transit services with the economic resources of the region.

A STRATEGY FOR SYSTEM PLANNING

The development of a regional transit system which affords optimum efficiency and economy suggest a broad strategy for system planning. Existing well patronized lines should be optimized to the maximum extent possible. New and improved routes should be provided in travel corridors where major transit-dependent populations exist and in corridors which have the highest potential for developing increased patronage.

Accordingly, a series of transit concepts and planning principles were developed to guide the development and evaluation of alternative transit plans to serve the San Gabriel Valley. These transit planning concepts serve to formulate a system-wide program after the deficiencies of the individual lines and service areas have been identified.

System Concepts

A series of transit system concepts were developed and evaluated relative to potential service within the San Gabriel Valley. These system concepts ranged from the half mile grid system concept developed by Los Angeles County[1] to a radial bus

rapid transit program. Each of the transit system concepts considered for the San Gabriel Valley included a number of individual type of services. These basic transit services included fixed route systems, bus rapid transit, demand-responsive service, and minibus service.

The basic transit system concepts evaluated for the San Gabriel Valley are shown in Figure 24. The four transit system concepts evaluated included:

1. Basic Grid Plan,
2. Time-Transfer System,
3. Classic Radial, and
4. Dial-a-Bus

Each of these systems was evaluated on a conceptual basis to determine the most attractive aspect relative to the particular geographical and socio-economic characteristics of the San Gabriel Valley.

1. Basic Grid Plan

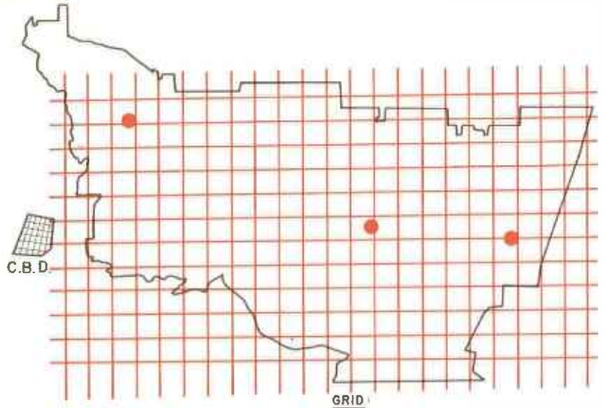
The development of a series of north-south and east-west routes on one-half mile intervals has been advanced as a desirable concept for the topography of the Southern California area. The operation of transit routes on streets at one-half mile intervals would insure all residential areas would be located within one-quarter mile walking distance of a transit line. The one-quarter mile distance is designated as the maximum walking distance desired by residents for reaching a transit boarding location.

The concept of the basic grid plan, therefore is to provide maximum coverage throughout the area. The development of "policy" headways of 20 minutes or less on this basic grid network ensures a high level of transit service over an extended coverage area. Among the advantages of the transit grid plan are the high coverage factors and service levels that can be obtained from the system. In addition, a grid system is easily understood by residents and can be utilized extensively without schedules.

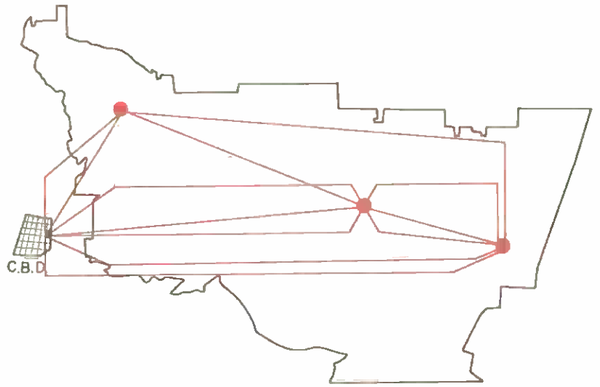
The disadvantages of a grid transit system include inefficiency of operation and indirectness of routing. A basic grid plan, to be effective, must operate continuously over long stretches of roadway which, in many instances have low-transit demand. Within the San Gabriel Valley, a basic grid plan would have to cross various industrial, vacant, or open space areas where there are little transit origins or destinations. This through-routing is necessary to keep the grid concept in operation. This through-routing over many long areas would produce little transit patronage and serve to be inefficient and costly in terms of transit operation.

The grid plan also requires a transfer with almost all transit trips. In many instances, two transfers are necessary to reach the final destination.

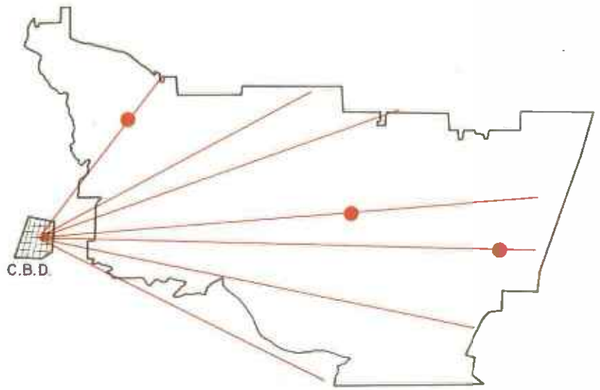
Even with high frequency headways, the time lost in transfers and the inconvenience associated with the indirectness of travel becomes more of a disadvantage than the high level of coverage produced by this plan. The basic grid plan could be developed in the San Gabriel Valley with a total of 38 routes. These 38 routes could provide complete coverage within the area and would require an estimated 325 buses. The overall travel times for the basic grid plan could be approximately the same or a little longer to the major activity centers of the region.



GRID:
Frequent service on all routes to make transferring easy.



TIMED TRANSFER:
Buses on all routes arrive at same time at main meet points to make transferring easy.



CLASSIC RADIAL:
Buses operate to downtown as fast as possible.

DIAL-A-BUS:
Door to door service with connecting radial line-haul routes.

TRANSIT SERVICE CONCEPTS

Wilbur Smith & Associates

Figure 24

2. Timed Transfer

The timed transfer system is a modern concept utilizing bus rapid transit and fixed route systems. The principal operation involves a time transfer type of operation where a feeder bus arrives at a stop within a designed area for a time transfer with the express system. Minimum waiting times for the transfer are a result of optimized schedules coordinated to the principal routes.

The number of east-west and north-south radials operating on the major freeways of the region would be established and the bus routes would operate into the main terminals of the facilities. The fixed route system would serve as a feeder system within the regional line haul system.

Over the long term future, this plan has several disadvantages. The service would never be as fast as comparable auto travel on arterial streets and freeways due to the necessary stops for passengers loading. The automatic requirement of a transfer in any inter-regional trip is also a serious disadvantage.

The time transfer type of operation, however, provides a high level of transit service and offers the greatest efficiency and economy to the transit operator. Local service is provided by the feeder bus systems which operate within individual regions of the area.

3. Classic Radial

The third concept which was evaluated for the San Gabriel Valley is the radial route system. Utilizing the principal corridors throughout the area (San Bernardino Freeway), the routes would focus in on a central location. Within the San Gabriel Valley the radial routes would be directed in an east-west direction paralleling the San Bernardino Freeway. The routes would focus upon the central business district of Los Angeles. Travelers would utilize these routes with transfers being available to the north-south routes that would be spaced throughout the region.

An economy of scale and directness of routing would result from the radial route system concept being applied in San Gabriel Valley. The radial route system has several disadvantages which include low coverage of population groups within the area, poor intra-regional linkages and increased travel times. The principal advantage of the radial route system is improved travel time service by transit.

4. Dial-a-Bus Plan

The concept of dial-a-bus as a regional transit service has been advanced for several major areas throughout the U.S. Santa Clara County has experimented in utilizing a regional dial-a-bus plan for service within the County.

A regional Dial-a-Bus Plan involves identifying individual areas for dial-a-bus service and linking those areas together by means of one or several line-haul systems. The dial-a-bus systems provide a high level of door-to-door service to residents within each particular zone. Residents desiring to go from one zone to the other are taken to the zone boundary from which a transfer is achieved. Where connections to the regional line haul system are available, residents are taken from their home to a transfer location where routing along the fixed route is provided by large typical fixed route systems. Individuals then leave the line haul service at the zone nearest their destination from which door-to-door service is provided by a dial-a-bus system within this particular area.

The concept offers the highest level of service available to transit passengers and produces the most comprehensive coverage available for an area. Regional dial-a-bus plans, however, have proved to be extremely costly in operation. In addition, the number of transfers for a long trip, as within the San Gabriel Valley also tends to be a severely limiting service factor.

SUMMARY

The alternative transit concepts for the San Gabriel Valley include several features which are believed to be desirable for incorporation into the total transit plan of the San Gabriel Valley. These include the utilization of certain express bus and feeder route systems for initial consideration and a combination of basic grid and radial route systems. The regional dial-a-bus program does not appear to have viable concepts that would be utilized throughout the San Gabriel Valley. However, in the rugged, mountainous areas through the San Jose hills and in the low density areas of the East San Gabriel Valley, the dial-a-bus concept has potential for local service and for possible many-to-one service to the local regional system.

Application of Concepts

Based upon a careful utilization of the various transit planning principles and operating concepts for the San Gabriel Valley, alternative transit systems were developed for consideration and testing. Many of the alternative transit concepts would serve the same routes as the existing systems. The alternatives represented variations of the basic concepts and utilize the advantages of each individual systems.

The basic underlying objective in the development and evaluation of alternative plans was the provision of local service in each of the major cities within the San Gabriel Valley and the connection of these local services with a countywide system of local, express and limited stop buses. The local route system and residential areas of each city are oriented either toward the CBD of Los Angeles or their own civic-commercial center and various industrial and commercial transportation centers within the county. Special emphasis has been placed on service to the low income and low car ownership areas which have the greatest need of transit service. Also special consideration has been given to areas of latent trip demand as revealed by the home interview surveys. Population density, major activity centers, and employment concentrations were also considered in system design and evaluation. These areas were covered since public transit user potentials are best in areas of high trip density.

The planning for the regional fixed route element of the total transit plan involved the identification of the major transit service deficiencies within the region and included the development of alternative transit concepts to better serve the area.

The basic transit deficiencies within the area were identified from the application of the concepts of through-routing, schedule adherence, route rationalization, and analysis of running time and headways.

Through Routing Techniques

"Through routing" is defined as the continuation of a route through a major generator. This is usually the CBD, but in the San Gabriel Valley, it is any area where a large number of potential transit trips will be generated. This principle is in contrast to the basic route structure in which

a route terminates at the generator. Since unnecessary transfers will readily discourage the use of transit by those trip makers who have the option of using automotive transportation, through routing has potential in that it enables a transit passenger to travel to his destination with less chance of having to make a transfer.

To accomplish through routing effectively, the following criteria must be satisfied:

1. Two routes should serve travel corridors which are located on opposite sides of the CBD or major generator.

2. The number of buses required and the times during which there is a demand for service must be nearly identical.

3. There should be an existing or potential demand for through travel for a portion of the transit riders.

4. Both routes should be stable and well established since one cannot be changed without affecting the other, and

5. The combined length of the two routes should not be excessively long and should permit convenient scheduling and operation.

Downtown Routing

A significant improvement in the operation of the bus system can be accomplished by consolidating several routes along a few streets which can be operated to optimize bus traffic. The benefit derived by bus patrons is that with buses concentrated on fewer streets they can choose between several routes which would serve their travel desires equally well. Headways are decreased and transfers are also facilitated by eliminating the need for patrons to walk over to another block. A side effect of this improvement is that auto traffic operations on streets from which these buses are removed will be improved.

Bus Priorities

Express bus demonstration projects have shown that tripmakers can be diverted from auto to bus if they can realize a significant time saving. Not only are bus priorities justified in attracting additional bus riders, but also because buses, due to higher passenger loadings and lower pollution rates per passenger, are more efficient than automobiles. Bus priorities are appropriate on radial travel routes and in downtown areas since buses use a sizeable portion of the curb for bus stops. Bus priority measures are:

1. Exclusive bus lanes which may be curb lanes, median lanes, or contraflow lanes,

2. Busway and exclusive bus streets,

3. Semi-exclusive facilities to be shared with other high-use vehicles,

4. Signal phasing, timing, and operation at intersections that would favor buses, and

5. Express bus routes.

Improved Transit Coverage

Analysis of socio-economic data and the coverage area of the existing transit system will usually reveal areas that are not served. Consideration should be given to expanding bus service to cover these areas if this area has a potential for

producing transit trips. However, the choice must be made between extending existing routes to cover those areas or introducing new routes.

Schedule Adherence

Irregular and unreliable transit service will readily discourage riders and will result in their loss to the auto. Therefore, it is necessary to have schedules that are realistic for both highway travel time and passenger loading conditions during peak and off-peak hours and for various days of the week.

Frequent Service and Policy Headways

Studies have shown that as the headways between bus runs increase, transit utilization declines rapidly. In fact, with a headway of 20 minutes or more, only 75 per cent of the potential passengers are being served. Therefore, the headways of buses should be as narrow as is economically and operationally feasible. Bus frequency should be based on the following considerations:

1. The existing demand as determined from actual field counts;

2. The existing demand plus potential demand; and,

3. Policy considerations for minimum service.

Route Rationalization

Ideally, bus routes should run along the major arterials or major streets outward from the city center in a radial pattern. However, in the San Gabriel Valley, many transit passenger origins are located off of the major arterials, this system may not be practical for all areas and a more circuitous route must be followed. Therefore, a compromise is required between minimum operating costs and maximum patronage.

Principle of Route Numbering

The adoption of a simple and logical system of route numbering allows patrons to know which buses serve the area and their origin and/or destination.

Utilizing these principles, a series of major deficiencies within the area were identified. The fixed route planning therefore, followed a plan to relieve these basic deficiencies.

REGIONAL FIXED ROUTE PLAN

Transit service between Pomona and Los Angeles and other cities within the West San Gabriel Valley was identified as a major concern of the project. Headways on existing routes are presently one hour or greater and access to other parts of the Valley is limited to routes on the San Bernardino Freeway. Therefore, routes to improve service between Pomona and Los Angeles by rerouting lines and extending existing systems were developed. Development of the basic routes was followed by consideration of improving headways on all existing routes.

The northwestern cities of the West San Gabriel Valley were identified as needing a connection to Los Angeles, Pasadena and the El Monte Busway. Therefore, the concept of a two-way loop connecting Los Angeles, Pasadena, Sierra Madre, Arcadia and Monrovia with the El Monte terminal was developed. In addition, the City of South El Monte does not have access or route connections with the City of Los Angeles or the El Monte Terminal. Therefore, a direct service route was planned to connect the El Monte Terminal and the City of Los Angeles.

The through-routing concept was applied to the Pomona-Mount San Antonio College, Cal Poly, Eastland Shopping Center and West Covina areas. Present routing is circuitous and indirect, therefore, a direct line between these areas was developed and evaluated. This route would be expected to provide local connecting services between these areas where at the present, freeway service is only provided.

The provision of a viable cross-county service between Long Beach and Altadena via Atlantic Avenue was a major consideration in the transit planning process. This program would include coordination with Long Beach Transportation Company. The development of a connection between Cal-Tech, El Monte, and Pasadena was an obvious application of downtown routing and cross-town service. Several routes were applied to this area for testing and evaluation.

The high density areas between the Santa Fe Dam and the San Bernardino Freeway serving the government center and shopping areas of West Covina was a critical area of transit service deficiency. Limited transit routes are in the area, and those that exist, have maximum headways. A series of high frequency lines connecting these areas was developed and tested.

The development of cross-town service from Pasadena to Cal-State L.A., connecting all the east-west routes to the San Gabriel Valley along the Fair Oaks, Fremont and Eastern corridors was considered a principal need for a viable transit system. In addition, service between El Monte Station and Glendale via the Highland Park and South Pasadena areas was another east-west route of major concern. The proposed route would operate along Mission Boulevard in South Pasadena and thus provide a direct through route between the El Monte Terminal and the City of Glendale. This route would focus on the central business districts of the cities of the West San Gabriel Valley.

The development of a modified grid system in Baldwin Park, West Covina areas was identified as being necessary to provide a high level of service to the shopping areas, government centers and employment centers of the area. This area is becoming one of the focal points of the East San Gabriel Valley, rivaling Pomona in terms of person trip production. A grid system to provide intra-community services as well as regional linkage was therefore deemed necessary in the total plan.

The development of a modified grid system for Pomona, Upland, Montclair and Ontario was also recognized as being the critical element in solving the present deficiencies in these areas. Service to the Claremont Colleges and then on to Ontario International Airport would also be a principal area of transit plan testing.

The provision of north-south service to Pasadena from San Gabriel and Temple City on to the Busway ramp at Del Mar would be an important element in linking these Central Business Districts to the Busway and to other linkages within the Valley. Utilization of the Del Mar Ramp would also provide a basic grid service in the West San Gabriel Valley.

With the development of a series of individual route systems to solve individual deficiencies, the linkage of these routes into a total system was the next step in the planning program. A complete system was developed and improved service levels were prepared for the entire route structure. Interchange systems between the El Monte Station and the principal downtown corridors and prime generators in the East San Gabriel Valley were also developed. Duplicating routes were deleted and efficient ones were identified. Alternative route structures to solve these individual deficiencies were evaluated

and the plan moved to final testing and evaluation.

In addition, studies were undertaken to investigate the feasibility of a dial-a-ride system operated by RTD in the various hillside communities of the southern sections of the East and West San Gabriel Valleys.

BUS RAPID TRANSIT PLAN

Bus rapid transit involves several variations of route service and system concepts. These include a total express bus system with feeder bus routes and bus rapid transit with park and ride programs.

Bus rapid transit was initiated in the Los Angeles area and the San Gabriel Valley in January, 1973, when the first stage of the El Monte Busway was opened to bus commuters. Phase II of the 11-mile Busway was completed in June, 1974, providing full preferential service from the Los Angeles CBD to the new El Monte bus terminal.

The El Monte Busway is the first completely grade-separated bus roadway developed in the United States for express-bus services between the city-center and the suburban communities.[1]

The Busway, shown in Figure 25, has had a dramatic effect on use of bus transit in the San Bernardino Freeway corridor of the San Gabriel Valley.

[1]The only other comparable facility consists of a pair of reversible lanes in the median of the Henry Shirley Highway (95) in Northern Virginia, providing access to downtown Washington D.C. The Shirley Highway facility is open for buses and carpools (4 or more riders) for inbound travel in the morning and outbound travel in the afternoon; it is closed the remainder of the day.

Before the Busway was opened in the beginning of 1973, about 4,000 riders entered and left the Los Angeles central business district each weekday on lines which served the San Gabriel Valley. A similar "cordon-line" check in the spring of 1974 showed riders on these lines (plus lines routed over the Busway) have increased to 20,500 daily riders.

Travel in the San Bernardino Freeway Corridor

In earlier studies[2], the potentials for preferential treatment of buses on the network of freeways which serve the greater Los Angeles area were examined. It was noted that buses can give the rider as fast a trip, door-to-door, as the car in corridors where there is heavy street congestion and the bus is provided with an exclusive, uncongested roadway. The time losses inherent in bus use, such as the walking and waiting at bus stops, stop-and-go operation of the bus itself and terminal access time after alighting from the bus, can be overcome if the running time of the bus in free-flow on a Busway is significantly less than the time expended by the motorist in a congested parallel street.

The El Monte Busway is built in a congested freeway corridor. Insofar as commuter traffic is concerned, the inbound peak-hour traffic flow on the San Bernardino Freeway regularly operates in the range of 10 to 20 miles per hour throughout the peak period on all portions of the route from Del Mar Avenue to the Los Angeles central business district. Significantly reduced travel speeds are

[2]Wilbur Smith and Associates, A Comprehensive Plan for Preferential Facilities for High-Occupancy Vehicles, prepared for SCRTD, March, 1974.

SAN BERNARDINO
FREEWAY BUSWAY

also encountered as far east as Azusa Avenue, with the morning inbound traffic flow operating well below 40 mph on some sections of the route. The freeway is currently being widened in this area to provide relief from congestion.

By contrast, the El Monte Busway provides a facility on which buses operate at average speeds of 50 to 55 mph right through the peak period. Direct comparison of door-to-door trips by persons starting simultaneously from a common origin, with identical destinations, have found that the bus rider can actually show a small time saving under these conditions.[3]

The diversion of motorists to the Busway during the daily commuter rush has had a detectable effect in reducing freeway congestion west of the El Monte Station. To the east of El Monte, the capacity of the freeway is presently being increased by the addition of another land for traffic in each direction. If the flow of traffic in the San Bernardino Freeway corridor continues to follow the historical growth pattern, this relief is likely to be temporary unless a concerted effort is made to divert more travel to the Busway.

The history of traffic growth throughout the Los Angeles area implies that congestion in peak hour travel on the San Gabriel Valley freeways is likely to continue to increase towards the east from El Monte. The provision of time advantage for transit service over the automobile will be necessary to maintain existing ridership levels and to attract ridership for other communities.

A growing volume of "choice" riders without a downtown orientation could also be expected to use an extended Busway as the overall volume of east-west travel rises.

THE LOS ANGELES CBD COMMUTER MARKET IN THE SAN GABRIEL VALLEY

Survey and analysis of bus performance on the El Monte Busway, compared to the peak-hour operations of cars on the parallel freeway lanes, has shown that the Busway enables buses to provide competitive door-to-door commuter service for persons who live in the San Gabriel Valley and work in downtown Los Angeles.

Potential Market

It is estimated that about 30,000 round trips are performed each weekday by residents of the Valley who commute to jobs in downtown Los Angeles.

These represent approximately 3.5 per cent of the daily work trips of the working residents of the San Gabriel Valley. Proportionately more trips are made to the Los Angeles CBD by residents of nearby communities, such as Alhambra and South Pasadena (about 6.5 per cent of their labor forces work in the CBD), while fewer residents of the more remote towns are oriented towards work places in central Los Angeles.

The 1967 origin-destination survey found over 200,000 daily person trips were made to and from work between the San Gabriel Valley and areas to the west. Travel to and from the Los Angeles CBD from the San Gabriel Valley was estimated to be 20 per cent of the total. Data from the survey indicate that about 6 per cent of the CBD trips were made by bus, probably representing the transit-dependent population, for the most part, since no express service comparable to the operations over the El Monte Busway were possible at that date. By

[3] W. V. Sheppard, Priority Techniques for Transit Operations in the CBD, Tech. Sharing Program, U.S. Dept. of Trans., San Francisco, Calif., Feb. 1975.

contrast, a very considerable increase in bus use followed opening of the Busway, representing many new bus riders who transferred from cars.

While the CBD is not the only work place accessible to bus riders who use the express services on the Busway, it is the most convenient. Persons riding Busway routes to destinations outside the CBD must transfer to other buses in the center, thereby losing time in the transfer and on the local or local-express buses they board. Until interchange (transfer) is possible within a network of busways or bus-priority freeway lanes, the most effective service provided by the Busway will continue to be for centrally oriented buses.

Transit Stations

A series of relationships were developed based on the analysis of bus commuter trips intercepted in the CBD cordon line origin-destination survey of bus riders, carried out in January, 1975. Tabulations of the residences of a small sample of the commuter trip reports (564 interviews obtained from Valley residents) found that the number of Busway users was related inversely to the distance between place of residence and the El Monte Bus Station. Highest rates of travel were by residents of El Monte, with the rate decreasing as the distance from the station increased.

Since the trips reported in the CBD cordon survey were mostly commuter trips, there is obviously a characteristic of the El Monte Station that is particularly attractive. The obvious answer would be the supply of free parking space at the station. The other significant factor in the patterns of trips on the Busway is the availability of good transit access to the El Monte Station. Except for buses which may enter the Busway at Del Mar Avenue, or for pedestrians who may use the Hospital and University Busway Stations, all access to the Busway is via the El Monte Station.

However, the patterns of high usage of the El Monte terminal goes beyond free parking and convenient freeway access. The terminal is a focal point, a solid permanent facility which offers security, information and convenient transfer to other transit routes or modes of travel.

From the analysis of current transit patronage on the Busway, a high level of use of stations similar to El Monte would be expected at other communities along the San Bernardino Freeway. The stations would need to be located at points where commuters enter the Freeway, so as to intercept the commuter's path as he is approaching the freeway.

Planning Requirements

The stations and other characteristics of potential travelers which need to be understood in order to induce greater diversion to transit have been explored. These characteristics if properly identified and applied would be expected to significantly increase transit's share of the daily travel market in the San Gabriel Valley.

- Most of these commuters have cars and are willing to use them for travel to and from work;

- The monthly cost of commuting is an important consideration to most workers; out of pocket costs for travel by bus are significantly less to those who can use buses;

- Overall door-to-door trip time is regarded as loss time and tripmakers seek to minimize the loss;

- Drivers dislike stop-and-go driving in congestion, but otherwise prefer the car to the bus;

- The free-moving bus on its own rights-of-way has a psychological appeal to the motorist stalled in traffic as it sails by -- some traditional negatives to bus use seem to be overcome, in part, by this consideration.

These are by no means all of the traits which characterize the automobile commuter, but are among the most important. The significance of each as it relates to the Busway services is extremely important:

- Commuters are willing to use their cars. One of the most expensive aspects of bus operation is the "gathering" of a busload of riders, even "express" buses must operate in the stop-and-go mode while picking up their load before switching to express travel on the Busway. The commuter with a car can save this cost to the transit operator if he will drive to a lot where he can park and board a bus that then needs to make only the single pick-up stop.

- Cost is important to the commuter; the bus trip is far less expensive than the comparable trip by car.

- Trip time is important. A work trip using express services on the Busway can equal or improve on the time by car in many cases.

- Drivers dislike travel in heavy stop-and-go congestion; furthermore, it offers transportation within the "peer-group" persons who live in the same neighborhood--a "socially acceptable" way to travel.

- Major stations would be expected to attract greater patronage than park-n-ride lots.

Parking Locations

As noted, the motorist prefers to use his car up to the point where he encounters congestion. In the San Gabriel Valley, congestion occurs on the approaches to the San Bernardino Freeway at many points during the morning peak period, especially in the West San Gabriel Valley, but also extending from the west well into the eastern portions of the travel corridor. Parking lots for commuters might be located near the main access roads to the freeway, just before congestion is encountered. However, the advantage of transferring to a bus will be minimal unless some form of priority treatment is provided for buses as they leave the lot. Such priorities might include access to freeway ramps, special highway lanes, traffic signal preemption devices, in order to enter the Busway as quickly as passing.

Size

Criteria for lot size include the number of CBD commuters who live in the areas tributary to the lot, some estimate of the proportion who might be induced to use buses, and the number of cars that would need to be parked at the lot (some commuters would be expected to arrive as passengers in cars parked at the lot; others would be dropped off-"kiss and ride"). A lot should also be large enough to support a high level of bus service (assuming it will be used at a reasonable proportion

of lot capacity), but not so large that traffic in and out of the lot causes problems, or walking distance become too long within the lot.

Studies of express bus commuting from suburban communities into downtown Washington, D.C.[5] (including analysis of the Shirley Highway express bus services) indicated that efficient commuter lots could be developed in sizes ranging from 300 to 1000 car parking spaces.

Service Frequency

The main argument that induces drivers to leave their cars in an express bus lot is the expectation that the overall trip time, door-to-door, will be about the same as driving the car-hopefully, a little less. The inbound trip in the morning is the critical one, for that is the time that the rider commits himself to the mode for the day; there is also the important deadline of getting to work on time. Thus, the more often the bus runs (the shorter the headway between successive buses on the route), the more nearly the rider can realize the full amount of savings achieved by faster running speeds on the Busway.

At 20 minute headways, assuming random arrival of passengers at the bus stop, the average passenger will have to wait 10 minutes to catch a bus; at 10 minute headways the average wait is 5 minutes; at 5 minute headways, the wait is only 2.5 minutes.

Criteria for bus headways can be arrived at in two ways: (a) policy decision to operate buses from commuter express lots at stated maximum headways; or (b) headways based on the number of buses needed to accommodate demand at the lot. These two are not necessarily incompatible, since sufficient demand will result in headways under condition (b) which are less than the maximum which might be set under condition (a). However, if sufficient demand exists, it is better to operate a single lot where the number of buses needed will meet both sets of criteria, rather than operate policy headways out of two smaller facilities, one or both of which lack parking capacity to develop demands which can make efficient use of the bus seats provided.

In studies reported by the Institute of Traffic Engineers,[7] it has been found that commuter parking lots served by express buses are most efficient when buses operate at headways of 10 minutes or less; the lots studied developed over 90 per cent of their potential patronage when 10 minute headways were operated, while on 75 per cent of these people patronized lots with 20 minute service. Thus, a 10 minute headway can be viewed as a desirable maximum. If the morning peak condition extends over a period of 1.5 to 2.0 hours, 50 passenger buses on 10 minute headways would supply 450 to 600 seats for persons boarding at a lot. Allowing for extra riders with the drivers who park, plus "kiss and ride" passengers, a lot with 400 to 500 car spaces could accommodate demand sufficient to fill most of the buses. A smaller lot (300 spaces) might be efficient if the peak period is only an hour to an hour-and-a-half in length. Five hundred parking spaces is a good size for manh commuter lots; where demand is especially heavy, a lot for 1,000 cars represents a reasonable maximum size.[8]

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[5] "New Fringe Parking and Express Bus Service" by Wilbur Smith and Associates for WMAIA, 1973.

[7] Change of Mode Parking--A State of the Art, ITE, Jan. 1973.

[8] The lot at El Monte Station, to be enlarged to accommodate about 1400 cars, is an exception to the 1000 car maximum because many buses pass through the station.

DEMAND RESPONSIVE TRANSIT SERVICE

Most public transportation systems today require some amount of financial support in addition to the revenues derived from fares. It is public policy to set fares at levels that are regarded as "reasonable" from the standpoint of low-income users of the services, in order that work opportunities, shopping, and the other activities that take people away from home be made accessible to as wide a population spectrum as possible. The deficits which arise from these policies are made up from tax revenues in great variety, including capital and operating grants from state and federal sources.

In the San Gabriel Valley, there is demand for more pervasive public transportation service, and higher quality (more frequent) service. Up to half of the resident populations are not presently within a quarter-mile of a bus line; many who are, find that service on the line operates on one hour headways during most parts of the day, or that service is provided only during peak periods. Even so, the cost of existing services presently operating may, generally, be regarded as those that are most likely to produce riders. Thus, the demand for service improvements implies that the communities served are aware of the need to pay an increasing rate of subsidy as the amount of new services increases, and that this is viewed as a reasonable and appropriate allotment of the public monies.

It behooves the transit operator, of course, to provide the desired levels of public transportation at the most economical cost. While conventional transit services presently offered in the San Gabriel Valley are of the fixed-route and schedule variety, it is not necessary that all services be of this type if the same, or better, quality of service can be provided in some other way. That is why so much interest has been shown in "demand-responsive" systems, such as "dial-a-bus" and similar services. While the costs per rider are usually far greater than for conventional fixed-route transit, the service can be made universal within a given community; to provide service to very-low-density portions of the community with fixed-route operations would often be more expensive than the demand service. This is the principal reason why many low-density areas have no public transit services at all.

The demand-responsive services also provide solutions to two other important deficiencies of fixed-route transit services offered on minimum headways--the vehicles operate door-to-door, thereby avoiding long walks and making the service feasible for elderly persons and others who are mildly handicapped, and the service can be scheduled to the time when the user needs it, avoiding the futile cruising up and down the streets of empty buses when there is no demand for service. Thus, a properly-sized and efficiently operating demand-responsive bus service can often provide full coverage of low-density areas, furnish a higher quality of a service (door-to-door) than conventional transit, and do so at less cost to the community than other, more conventional services. A policy decision to provide such services is in keeping with the past decisions to underwrite the excess costs of conventional transit when fares are set at the nominal rates presently in effect.

Conventional bus transit services consists of buses assigned to fixed routes over which they operate according to a timetable. Printed schedules are usually issued to the public, on tables which are shown a map of each route and the scheduled arrival times for buses at selected points along the route. The amount of service allocated to each route is tailored to the level of demand according to time of day and day of week; at hours when demand is very low, buses assigned to the route will be

operated at a "policy" level of service, or will not operate at all, even though buses on other routes may remain in service.

Demand-responsive transportation systems, by contrast, are not scheduled to operate on a pre-determined level, but are active only when a customer calls for service. In most systems, the buses do not follow fixed routes, but are directed over the street network in the most direct or fastest pattern that will meet the passengers' requirements. An important component of the system is a means of radio communication with drivers by a centrally located dispatcher who receives the telephone calls from would-be passengers and relays the requests to the bus operators. The dispatcher usually has provisions to accept calls for service up to several hours or days in advance and for repeated services required at regular or irregular intervals, such as weekday requests for commuter service.

The concept of a demand-responsive service is not new, but the wide-spread participation by public bus transit service operators is relatively recent. Within the last 6 to 8 years, federal, state and local governments have participated in a variety of experiments and demonstrations of demand-responsive urban bus services. The Urban Mass Transportation Administration (UMTA) of the U.S. Department of Transportation has recently compiled and published a report on experience with more than 80 such services in various parts of the United States and Canada.[9] UMTA has participated in planning and financial support for most of the U.S. examples.

The UMTA report covers nine examples of demand-responsive transportation systems in California cities which have operating experience. As can be seen, all but two of these were funded with state or local funds, one entirely by UMTA, and one by private interests. Two were exclusively for senior citizens (free), while most provided reduced rates to seniors. Except for one of the senior citizen services, all were based on a "many-to-many" service concept under which a rider would be picked up at any address in the service area and delivered to any other address. The number of vehicles in use ranged from a single vehicle (the two senior citizens services) to 14. (The private service consists of a Yellow Cab operation, with 18 vehicles in the fleet, but these are not used exclusively for the special service.) With the exception of the Watts Model Cities area, the Yellow Cab Service, and the two senior citizens buses, the five remaining operations provide buses and enjoy patronage levels that are more-or-less consistent with the size of the areas they serve.

The nine applications described in the report by no means represent the full extent of interest in demand-responsive transportation in California. The community of Claremont initiated a one-bus service in the "many-to-many" mode in October, 1974, and carried more than 1250 passengers during its first two months of operation; use is stabilized at about 30 passengers per day.

The most ambitious demand-responsive service in the nation was begun in Santa Clara County, California, in the Fall of 1974. The entire County has been subdivided into 18 Personalized Service Areas, incorporating more than one million inhabitants. Single-vehicle demand-responsive service is available within each of the Personalized Service Areas, or buses will deliver patrons for out-of-area destinations to a transfer point where they

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[9] Demand-Responsive Transportation: State-of-the-Art Overview, August 1974, UMTA, U.S. DOT, Washington, D.C.

may take an arterial service to the Personalized Service Area of destination (or transfer directly to buses of the adjacent Personalized Service Area, if the trip is only into the next service area). Trips, regardless of length, cost only 25¢ with free transfers to any service within Santa Clara County. The system is, understandably experiencing start-up problems which are expected to diminish as problems are identified and corrected.

Within the San Gabriel Valley, numerous suggestions have been made for demand-responsive services, some of which are under serious consideration. A detailed study was undertaken by the Jet Propulsion Laboratory at California Institute of Technology for a system for Pasadena.[10] The plan calls for initial services covering only a portion of the City of Pasadena, to be expanded to the entire City, and then to selected areas nearby, in successive stages of development. Estimates of patronage, revenue, and deficits are contained in the report, along with some very thoughtful observations on the initiation and operation of a successful demand-responsive service.

The Los Angeles County Road Department prepared a preliminary draft of a report[11] which presented two alternative plans for transit improvement in the San Gabriel Valley. The second of these, Alternate B, considered the development of a dial-a-ride system to improve existing transit services. Five communities, or service areas, were identified as likely candidates for the service. Estimates of demand and costs to provide the service were prepared, based on generalized experience elsewhere. The plan is of particular interest because of the attempt to define the populations most likely to use bus transit services and to suggest service levels geared to those considerations.

PRINCIPLES OF DEMAND-RESPONSIVE TRANSPORTATION

Demand-responsive transit systems, working without fixed routes or fixed-time schedules, take a variety of forms. These may be identified as the following types:

Route Deviation
Subscription Service
Many-to-one, Many-to-few, Many-to-many
Para-transit

Route deviation services are of the conventional fixed route and time-scheduled, variety except that bus drivers are in radio contact with a dispatcher. The dispatcher may direct the driver to deviate from his route (by not more than some pre-determined number of blocks) to make a pick-up, the driver returns to his route, perhaps deviating again to drop the passenger at an off-line destination. The service usually requires a premium fare.

Subscription services are usually of the many-to-one or many-to-few variety and are repeat traffic, either on a weekly or monthly basis. Because a number (bus load) of riders seeking the subscription service can be scheduled ahead of time, a successful operation can obtain high utilization

[10] Pasadena Intracity Transportation Study, Solloway, C.B. and Houser, B.C., Jet Propulsion Laboratory, Calif. Inst. Tech., Pasadena, Ca., Dec. 1973, JPL Document 1200-125.

[11] San Gabriel Valley Area Transit Study, Los Angeles County Road Department, January, 1974.

from commuter services of this type. Aggressive marketing of subscription services may produce revenues to help offset the high expenses of random calls during other hours.

Many-to-one, many-to-few, many-to-many are self-explanatory terms. The efficiencies vary greatly, however, since the collection of passengers with a single destination, such as a large office building, a shopping center, or a bus terminal, can be performed with relatively little indirection of movement in the pick-up area. The many-to-few service is nearly as effective if several generators are near to one another, such as in a central business district. The many-to-many service can be very inefficient, especially if only one or a few vehicles are available to accommodate random trip patterns throughout the service area. If a fleet of several vehicles is in operation, it may be possible to group travel patterns, in effect developing a "few-to-few" pattern that may be quite efficient. Computerized techniques are required when a fleet of considerable size is used, and computer algorithms to define the most efficient routing patterns for passengers calling at random times are being developed for use with this technique.

Para-transit services is the term applied to specialized transportation for particular classes or groups of persons, such as the use of wheelchair buses for crippled or non-mobile handicapped persons; for transport of elderly persons only; etc.

CHARACTERISTICS OF DEMAND-RESPONSIVE SERVICES

The UMTA report on Demand-Responsive Transportation has summarized some of the main characteristics of the many special bus services investigated. It is useful to consider how this new form of public transportation is being used in other places in order to appreciate how it might be used in the San Gabriel Valley, the advantages of certain techniques, and the kinds of problems that may need to be overcome.

Objectives

Most of the demand-responsive systems presently operating are in the many-to-many mode. This reflects the fact that conventional transit systems, which the demand-actuated forms often supplement, provide limited choice of travel patterns; while the choices offered are those which create the largest levels of demand, such as the central business districts, major employment centers, etc., the majority of tripmaking in most urban communities has a very random pattern that is not well suited to fixed-route services.

The fundamental objective of the proposed demand-responsive services is to provide a supplemental transportation capability to augment the regular fixed-route services. The proposed transit improvement plan incorporates extension and realignment of existing routes and improved service levels throughout the highest-density residential districts in the San Gabriel Valley; the demand services would be designed to cover areas not served, to provide special services within the fixed-route system, or to provide transit services during hours when it is not considered economical to schedule regular transit service.

Population Density and Size of Service Area

Where demand services are established to supplement a fixed-route system, as proposed for the San Gabriel Valley, the service would be established in the least-densely settled areas, or would supply limited special transportation in areas covered by the fixed-route system. The amount of trip-making that might be attracted to the service under these conditions is not easy to assess,

particularly since the economic condition of residents, the proportion who are elderly and/or handicapped in terms of ability to travel by transit, the number of households without cars, or with a single car, and the number of young persons below driving age, are all variable factors which relate to use of these special services. The level of fare charged can also be a critical consideration.

In general, the size of bus fleet needed to serve an area of a given size is related to the amount of area as well as population densities and the competition of other transit modes. Where population densities range between 3,000 and 6,000 persons per square mile, it is common to provide one to two buses per square mile of area; service areas range widely in size, with most of the services reported in the UMTA study covering areas of 5 to 20 square miles, with 40 or more vehicles in areas where transit services are entirely of the demand type. Where demand services are integrated with a fixed-route system, the number of vehicles per square mile should be reduced to suit the demand for a premium type of service.

Vehicle Size

Most of the demand-responsive services utilize buses smaller than the usual 45-50 passenger city bus, except where the principal function is to provide subscription services which can make efficient use of the large bus. Buses in the 20-25 passenger range represent a compromise between the need for large vehicles for the most efficient operation of subscription services and space requirements of vehicles in the many-to-many mode which average under 10 persons hauled per hour in most situations and can be accommodate nearly all their simultaneous loads in a six-or-eight passenger van or limousine.

Where the service will be almost entirely of the many-to-many type, the use of smaller vans and limousines will make the vehicles less obtrusive (and more acceptable) in the residential neighborhoods. They will also be easier to maneuver in hilly areas where streets are often narrow and winding.

Average Vehicle Productivity

The average number of persons carried per operating hour is the most common measure of productivity for demand-responsive services. However, these values vary considerably, depending on the size of the vehicle and type of service provided. Large vehicles used in a successful subscription service which take up the full capacity of the buses during two or more trips per day can often raise the daily average to a very respectable figure; however, this may tend to disguise disappointing performance of the many-to-many midday and evening services, and productivity figures should be maintained separately for each type of service if they are to provide useful guidance to the administrative staff. The goal of most many-to-many services is a productivity average of 8 to 12 passengers carried per vehicle hour of service.

Number of Employees

Manpower needs depend both on the size of the fleet and the hours of operation. Manpower includes the drivers, call takers, dispatchers, and administrative staff. Not generally included are mechanics and maintenance people, who are often part of a motor pool staff in the public works department, the local transit service company, etc. Overall, the fleet that offers 18 to 24-hour service with 10 to 20 buses may require 3 to 4 full time employees per bus.

Wage Scales

Salary costs have proven to be highly variable in the many different urban areas where demand-responsive transit has been tried. Where no transit service presently exists and the new system is introduced without union labor and with much volunteer effort on the part of the local residents, costs have been quite low. Systems with heavy citizen participation have been largely of the para-transit type, offering free or very low cost transportation to elderly, handicapped, and similar disadvantaged groups.

At the other extreme are the demand-responsive services operated by an existing transit system, or in an area served by a system and where union wage scales must be met. Wage rates are highest in the very large metropolitan areas, of which Los Angeles is one. The drivers generally draw the going union wage, plus fringe benefits; dispatchers can be expected to be paid at a similar rate, while clerical and other assistance may be somewhat less expensive. Administrative staff are usually paid annual salaries comparable to similar work elsewhere in the community.

INSTITUTIONAL PROBLEMS

At the technical level, a great deal of attention has been given to the planning of demand-responsive bus services of different kinds and to the operational techniques needed to make them work. Relatively little attention has sometimes been given to the institutional setting--the legal, political and financial context within which the services must operate. The institutional considerations include:

- Legal status
- Labor Considerations
- Funding
- Impact on other transportation services
- Community acceptance
- Management capability

Legal Status

The institution of a new transportation service is bound to conflict with some established services and will raise problems of franchise restrictions and rights.

Labor Considerations

If the new services are offered as an expansion of existing transit services, and these are presently operated under terms of a labor union contract, those working conditions can be expected to apply to the new services. If a new service is being organized in areas where none now exists, the question of wage rates and working conditions is sure to arise. There can be a great difference in the costs of providing transit services of the highly labor-intensive demand variety, depending on the presence or absence of a union contract, and the terms of such a contract. Jurisdictional disputes between taxi-cab unions and transit workers unions (or different transit unions) are possibilities which need to be considered and resolved.

Sources of Funds

Virtually none of the demand-responsive bus services offered in the United States and Canada have been able to earn sufficient revenues from fares and related sources to meet the operating costs of the service. Fares have purposely been kept low so that segments of the population with

little money to spend on transportation can take full advantage of the service. In setting the fares, a policy of public support has been set forth. Funds to subsidize the operating losses are derived from a variety of sources in different jurisdictions.

Competing Services

Nearly all of the existing demand-responsive transit services encounter competition from other forms of public transportation. Most often, these are local taxi services and fixed-route transit systems. In general, the competing services most likely to lose profitable patronage from introduction of a publicly-supported demand-responsive bus service are the taxicab operators.

Community Acceptance

Whether or not the community in which the demand-responsive service is established will prove willing to support the operation depends on several things:

- Efficiency - Is the service well operated and sufficient to meet demands within acceptable performance standards? Unless the staff is well-trained and response to calls is prompt, the service may irritate the prospective user more than it helps him; public dissatisfaction with the demand services seems to stem more from delays and failure to meet anticipated behavior levels promised at the time they were initiated than any other cause.

- Cost - Since the public is usually being asked to support a large share of operating costs out of tax revenues from one source or another, dissatisfaction will be shown not only as failure to use the system, but a positive vote against continuation of the service.

- Coverage - Since the services proposed for the San Gabriel Valley consist of an improved fixed-route bus system, supplemented selectively with demand-responsive services, only a portion of the residents in any particular community are likley to have access to the demand service. If this is an attractive and well run operation, the recipients of the service may be perceived as being favored over those solely dependent on the fixed-route system. Whether or not a cost differential exists for users of the demand-type facilities, resentments could arise among some of the public.

Management

Special training of staff and personnel is a basic requirement of the demand-responsive systems, and a quite different intellectual approach to provision of such services than is customary in transit system operation. While the emphasis in fixed-route services is the development of efficient schedules and slavish adherence to fixed routes and schedules as the key to efficient operation, the challenge in operating a demand-responsive system is to maintain an open and flexible approach to ever-changing patterns of trip demands. Managers must understand and train their people for this type of response; a far more personal relationship must be maintained between the customer and the operating staff, and management must be selective in securing persons with personality characteristics and attitudes which best meet these requirements.

Chapter 5

The Recommended Plan

The recommended transit improvement plan for the San Gabriel Valley has been developed to provide improved public transit service within existing corridors for current transit patrons and to add new express and local routes in areas which are presently without service. The recommended plan is based upon an extensive analysis of alternative transit system concepts and service levels. It has been designed to achieve a balance of transportation services and travel demands.

All major travel demands including local, inter-community and regional trips are served by the plan. The plan accommodates existing "captive" transit users as well as the latent travel requirements of the transit-dependent population. A high level of commuter transit service is provided in order to offer a competitive mode of travel for the "choice" trip maker.

The recommended transit plan provides for a greatly increased level of mobility for area residents, and provides accessibility to all modes and travel generators.

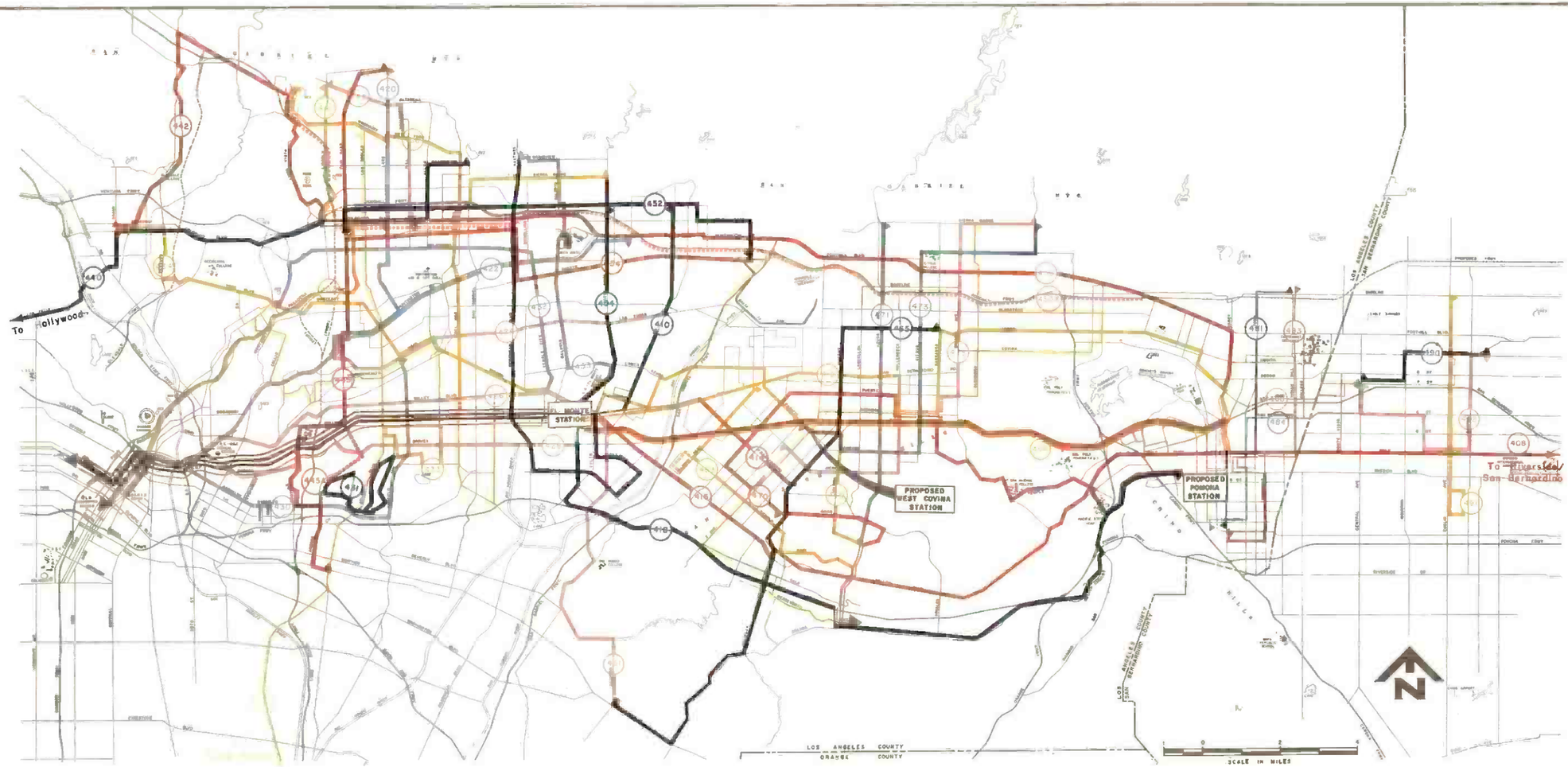
THE RECOMMENDED TRANSIT PLAN

The recommended transit plan for the 348 square mile study area is shown in Figure 26. The plan includes an express bus system, an extended local route plan, a demand-responsive and mini-bus test program. Based on modern concepts of system continuity and configuration, the recommended improvements will provide increased transit service, unify the communities of the San Gabriel Valley and provide for improved environmental conditions.

The plan incorporates many of the recommendations set forth by the individual communities and contains many of the suggestions made by individual citizens in the attitude and expectation surveys. It adopts many principals of the County Plan and other proposals for the Valley. However, the plan is far broader in scope and reflects many advantages in service levels and system concepts.

The recommended transit plan for the San Gabriel Valley includes 40 routes, 3,232 bus trips and over 61,150 daily bus miles of operation. The recommended plan calls for approximately 50 more buses than are presently assigned to peak period service on the bus lines now operating in the San Gabriel Valley. This is approximately 18 per cent more buses than the 270 vehicles now used in the peak period on Valley routes.

Through route rationalization, extension of services to new areas, the improvement of bus frequency on many routes during midday and evening hours,



THE RECOMMENDED BUS IMPROVEMENT PLAN

SAN GABRIEL VALLEY

Wilbur Smith & Associates

Figure **26**

and increases in the number of bus trips operated on weekdays, a total of 1,172 trips would be added to the 2,060 currently scheduled bus trips.

Daily bus miles of in-service operation would rise from approximately 43,545 to 61,150 for an increase of approximately 40 per cent.

Another general measure of the impact of the Recommended Bus Improvement Plan is the number of Valley residents whose homes are within the service area of bus routes. At present, about 54 per cent of all homes in the San Gabriel Valley communities are within one quarter of a miles of a bus line. The "coverage" of residential areas would be increased to 89 per cent by the new plan, based on the quarter mile criterion. This coverage factor does not include the population that would be covered by the demand-responsive services described in the report.

MAJOR FEATURES OF PLAN

The Recommended Plan contains three main elements which have been integrated into a single comprehensive transit system. The three principal elements include:

- A Regional Fixed Route System
- An Express Bus-Park-n-Ride Program
- A Demand-Responsive - Minibus Demonstration Program

In addition, a new transit route numbering system is recommended in conjunction with a marketing program to introduce the new system to the San Gabriel Valley. The numbering plan has been designed to distinguish between routes which have mainly an east-west orientation (even numbering) from those that provide mostly north-south service (odd numbering). The numbers of east-west routes would increase from the southern to the northern sections of the County, while numbers of north-south routes would increase as they progressed outward from Pasadena to Pomona.

The Regional Fixed Route System - The principal feature of the Recommended Transit Plan is a revised and expanded regional system of fixed route transit services. Although there have been large increases in the number of people and jobs throughout the San Gabriel Valley over the past 20 years, with dramatic changes in land use types and densities, bus routes have undergone little change prior to opening of the new Busway.

The Recommended Plan calls for extensive route revisions and simplification in the West San Gabriel Valley and the provision of many new services in the intensively-settled communities of the East San Gabriel Valley. The Regional Fixed Route System proposes:

- Maximum "policy" headways on all local bus lines be established so that routes in the West San Gabriel Valley provide service at not less than 20-minute intervals during daylight hours and 30-minute intervals after 6:00 P.M. until scheduled operations are completed.
- Maximum "policy" headways on East San Gabriel Valley routes which provide service at not less than 30-minute intervals during midday hours and 1 hour headways after 6:00 P.M. until scheduled operations are closed down for the day.

- Realignment of routes to provide north-south access across the Valley at frequent intervals to overcome the present deficient service. This will permit residents from any part of the area serviced by transit to reach any other part of the Valley with a minimum of delay and transfers.

- Improved System Viability - One of the most significant features of the plan relates to the conscious effort to optimize the level of service provided by each separate bus line. Each of the existing lines has been carefully examined and its serviceability reevaluated in terms of basic function. Circuity and indirectness of travel which detracts from the efficiency of line operations have been minimized, while the significance of activity points along the line have been examined and lines re-routed where more productive alingments are possible. The rerouting has not been as disruptive to the existing system as might first be assumed, since most routes presently focus on the most important attractions, but it has led to improved alignments and route extensions which make more areas accessible to bus users.

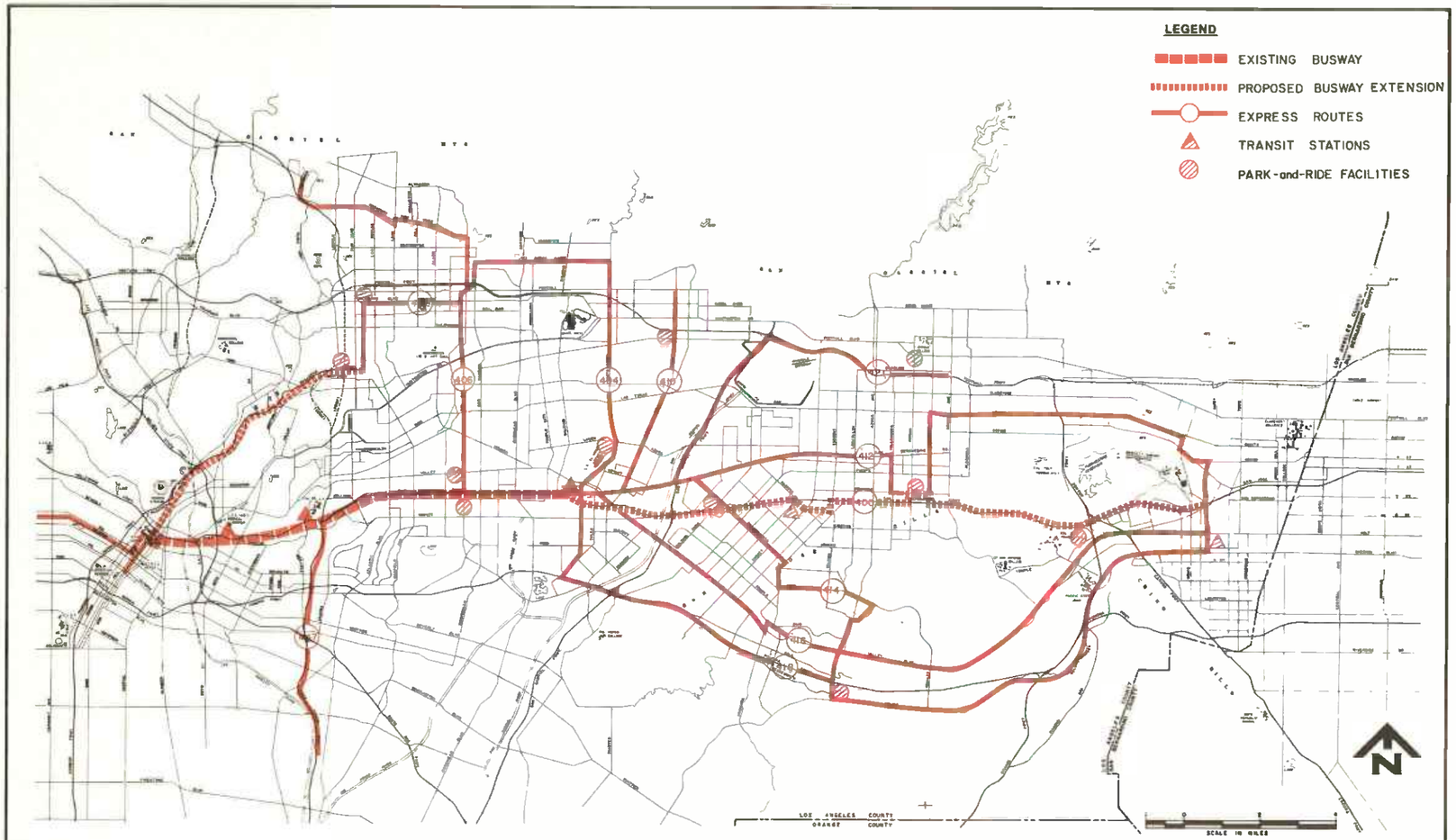
Each transit route has also been carefully evaluated with respect to integration with the other lines it meets or crosses. A number of new lines have been introduced, particularly those with north-south orientation, in order to optimize accessibility between parts of the San Gabriel Valley by providing more direct routing. These measures would add appreciably to accessibility between areas in the East San Gabriel Valley where existing services provide primarily east-west movement along a few principal thoroughfares. The Plan thus incorporates the desirable features of a "grid" system of routes without introducing unproductive or inefficient lines.

The Express Bus System - The El Monte Busway Service is so unique that it presently dominates public transportation planning in the San Gabriel Valley. The Busway has made it possible for public transit to compete on equal terms with the automobile for travel oriented towards central Los Angeles and new opportunities for improvement in the transit markets have been opened up for transit services throughout the Valley.

The El Monte Busway and a series of new routes numbered in the 400-series were added to bus services in the San Gabriel Valley within the last two years. However, existing local bus routes and schedules have had little modification other than to re-route parts of the trip on some lines over the Busway for faster access to and from downtown Los Angeles.

The Recommended Plan proposes that the El Monte Busway become the principal feature of a system of express bus routes with connections to all Valley communities. As shown in Figure 27, express services will operate on the Pasadena, Pomona, Long Beach and San Bernardino Freeways providing limited-stop and non-stop services to and from the principal trip generators in each community to downtown Los Angeles. Peak-period commuter travel oriented towards central Los Angeles is made particularly attractive by the El Monte Busway, and a proposed system of park-and-ride lots would extend the competitive advantage of travel on the Busway to all of the East San Gabriel Valley-Pomona areas and to much of the West San Gabriel Valley.

Demand-Responsive Transportation - Two types of demand-responsive bus services are defined for demonstration and the applications for each described. It is recommended that a demand-responsive system be implemented in the La Puente-Hacienda



EXPRESS BUS ROUTES

SAN GABRIEL VALLEY

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Figure **27**

area and a Minibus distribution system be tested in Monterey Park. These two types of service should be initiated at these locations in the San Gabriel Valley, to the extent existing budgetary conditions permit. In general, the demand-responsive service and minibus systems will provide the following functions:

- Provide route-deviation services (for premium fares) to deliver or pick up riders directly at their door during inclement weather or after dark;
- Supplant fixed-route services during hours of very low demand when headways for scheduled service would be very long, or buses would operate empty;
- Provide transit services to low-density residential areas where fixed-route and scheduled bus services cannot be justified;
- Provide subscription (door-to-door) service for groups of users on a pre-scheduled basis; typically, commuter service for groups of workers with a common destination; and,
- Provide special equipment and door-to-door service for handicapped and/or elderly patrons.

A detailed description of each of the elements of the recommended plan is contained in the following paragraphs.

A REGIONAL FIXED ROUTE PLAN

The regional fixed route plan is designed to improve the level of service to the San Gabriel Valley residents through an expanded system of routes and increased frequency of operation. The operational characteristics of the proposed fixed route system, compared with the existing system, are tabulated in Table 29. With an increase of 4 routes and 50 vehicles, there is an increase of 40 per cent in daily vehicle miles from 43,545 to 61,150. There is an increase of 35 per cent in Saturday bus miles and 85 per cent in Sunday bus miles. This increase in bus miles is a reflection of the increased number of bus runs and frequency during the base hours and on weekends.

Table 29

OPERATING CHARACTERISTICS
OF EXISTING AND PROPOSED SYSTEMS

San Gabriel Valley

	EXISTING	PROPOSED	PER CENT CHANGE
Daily Bus Miles	43,545	61,150	40
Saturday Bus Miles	24,153	32,539	34
Sunday Bus Miles	12,690	23,487	85
Number of Buses Required	270	320	18
Number of Routes	36	40	11
Number of Bus Trips	2,060	3,232	56

This fixed route system will provide transit service to 89 per cent of the San Gabriel Valley residents, 99 per cent of the no vehicle households, 93 per cent of the persons age 65 and over and 86 per cent of the population age 16 and under. These coverage statistics are shown in Table 30.

The recommended fixed route system is characterized by a new and comprehensive route numbering system. All routes serving the San Gabriel Valley will carry a "400 Series" designation. The "400 Series" begins with busway routes with designations in the 400 to 419 range with the cities of Arcadia and Alhambra having bus route numbers beginning with

Table 30

SERVICE CHARACTERISTICS OF
EXISTING AND PROPOSED SYSTEM

San Gabriel Valley

	PER CENT EXISTING	PER CENT PROPOSED	PER CENT CHANGE
Coverage of Population	53	89	+36
Coverage of No Vehicle Households	74	99	+25
Coverage of Labor Force	62	88	+26
Coverage of Persons 65 or Over	65	93	+28
Coverage of Persons Under 16	52	86	+34

420. The numbers expand easterly with Pomona having the 480 series and Upland having the 490 series.

The "400 Series" - This series operates along the San Bernardino Freeway Busway. Route 400 runs from Los Angeles to Pomona with stops at El Monte, and the West Covina and Eastland Shopping Centers. Route 402-404 is a two-way loop connecting Pasadena, Sierra Madre, and Arcadia with Los Angeles and the Busway. Residents of these cities can now travel to Los Angeles within 30 minutes travel time. Route 406 exits the Busway at Del Mar and runs to the Jet Propulsion Laboratory through Pasadena.

The "410 Series" - These five routes (the 410, 412, 414, 416, 418) are east-west routes that connect the Los Angeles Central Business District with the San Gabriel Valley via the Busway to El Monte. The 414 links the El Monte Station with Eastland Shopping Center and Pomona via San Bernardino Road and Arrow Highway. Route 410 follows Valley Boulevard to Pomona and the 418 travels over the Pomona Freeway and Colima Road to Pomona, Route 412 links El Monte Station with Puente Hills Shopping Center via Francesquito Avenue, Amar Road, and Azusa Avenue. The 416 route travels up Peck Road from El Monte Station to Monrovia.

These lines operate at 30 minute headways during the base hours. Express services are provided during the peak hours without stops at the El Monte Station. These express runs are the 411, 413, 415, 417, and 419. The 413, 417, and 419 have 15 minute headways; the remainder have 30 minute headways.

The "420 Series"- The "420 Series" consists of six routes that link Los Angeles with various areas of the West San Gabriel Valley. The 420 and 422 lines have 3 runs per hour from Los Angeles through Pasadena and Arcadia, respectively, via Huntington Drive. The 424 line has 6 runs per hour (10 minute headways) to Arcadia via Huntington Drive and Las Tunas Drive. The 426 and 428 parallel the Busways with the 426 line traveling along Valley Boulevard to the El Monte Station, and the 428 traveling along Garvey Avenue. The 430 travels along Brooklyn Avenue and Garfield Avenue. The 426, 428, and 430 have 10 minute headways.

The "430 Series" - This series has three routes, the 432, 434, and 436, all operating with 20 minute headways. The 432 follows a winding route from Highland Park to the El Monte Station via Main Street, Ramona Street, Del Mar, and Walnut Grove Avenues. The 434 travels along California Boulevard and Temple City Boulevard linking Pasadena, Arcadia, and the El Monte Station.

The "440 Series" - This series of three routes is characterized by two-way loops. The 440 is a one-way loop that provides local service in the Pasadena-Altadena area with 20 minute headways. The 446-448 is a two-way loop linking Pasadena, Arcadia, Monrovia, and Duarte via the major routes of Foothill Boulevard, Duarte Road, and California Boulevard. The 442-444 is another two-way loop that travels through Sierra Madre, Arcadia, Rosemead, El Monte, and South El Monte via Rosemead Boulevard, Rush Street and Santa Anita Avenue with a connection at the El Monte Station. The 442-444 line and 446-448 line will operate with 20 minute headways.

The "450 Series" - This series contains 9 routes that operate in the West San Gabriel Valley. The 450 runs from Altadena to Long Beach via Atlantic Boulevard with 20 minute headways during the peak. The 451 is an extension of the 450 to Jet Propulsion Laboratory during the peak hour. Route 452 links East Los Angeles and Altadena through Cal-State. This line will operate 6 runs per hour during the peak hours and 3 runs per hour during the base. The 453 is the same except that it will continue on Fremont Avenue and Monterey Pass Road rather than onto the Cal-State campus.

The 454 runs from northeast Pasadena to Hollywood via Colorado Boulevard at 20 minute headways. The 456 runs from Glendale to Pasadena and Jet Propulsion Laboratory via Colorado Boulevard, Linda Vista Avenue, Foothill Avenue, and Verdugo Road at 30 minute headways. The 458 connects Pomona and Pasadena via Foothill Boulevard. The 459 is the same but will stop at Duarte rather than continue to Pomona. The 458 and 459 have 30 minute headways. Route 457 is also a connection between Pasadena and Pomona but this line runs along the Foothill Freeway twice an hour during the peak hours.

The "460 Series" - The "460 Series" has 5 routes that operate at 30 minute headways in the East San Gabriel Valley. The 450 runs from the El Monte Station to West Covina and Woodside Village along lower Azusa, Pacific, and Valinda. The 462 runs from the El Monte Station to Whittier Quad via Rio Hondo and Peck. The 464 runs from Baldwin Park to Puente Hills Mall via Baldwin Park, Temple Avenue, and Azusa Avenue. The 466 runs from Glendora along Gladstone Street, Covina Boulevard, Workman Avenue, La Puente and Wedgeworth Drive into Puente Hills Mall. This line provides service for Glendora, Baldwin Park, Covina, West Covina, and La Puente residents to the major shopping centers in the East San Gabriel Valley. The 468 line runs from Covina to Whittier along Colima, Glendora, and Arrow Highway.

The "470 Series" - The 471 line is the same as the existing 170 running along Azusa Boulevard from Azusa to Puente Hills Mall. The 472-474 is a two-way loop between the West Covina Center and Glendora via the Eastland Shopping Center. The major streets along the route are Citrus, Merced, Hollenbeck, and Grand Avenues. The 476 runs from La Puente to Pomona along Amar, Puente, Orange, Temple, and Holt into the Pomona Station. This route connects Mt. San Antonio College and Pacific State Hospital to Pomona and the Covina-West Covina areas. The "470 Series" routes all have 30 minute roadways during the peak hours.

The "480 Series" - The "480 Series" provide local service in the Pomona-Claremont area with 20 minute headways. Route 480 runs from West Pomona to Montclair Plaza. The 482-484 loop will circulate through Pomona linking the Claremont College, Montclair Plaza, and the Pomona CBD. The 486-488 is primarily a set of north-south loops through the residential areas of Pomona and Claremont Colleges.

The "490 Series" - The "490 Series" are lines that operate in San Bernardino County. The 490-492 loop links the Montclair Plaza with Upland. The 494 runs along Euclid from Base Line Road to Francis Street. These lines will operate at 30 minute headways.

EXPRESS BUS PLAN

A bus rapid transit plan is proposed to serve the entire San Gabriel Valley. The plan is designed to make bus transit more attractive, both to the transit "captive" populations and to the workers who now commute by car. Park-and-ride lots would be an integral part of this plan, since the speed advantage of a express bus transit on the El Monte Busway is lost, if buses have to perform the "gathering" function at the residential end of commuter trips or other centrally-oriented travel.

An extensive network of exclusive busways are recommended to serve the San Gabriel Valley. The El Monte Busway will serve as the backbone or focal point of the system; however, five new major routes are recommended for implementation.

San Bernardino Freeway - The present 11-mile El Monte Busway is recommended to be extended by use of peak-hour exclusive lanes on the San Bernardino Freeway from Pomona to El Monte. The Busway and the recommended exclusive lanes would provide preferential treatment for buses for a total of 28 miles, representing an increase of 17 miles over the present 11 mile system.

Average peak hour congestion on the San Bernardino Freeway from El Monte to Covina in itself is not sufficient to warrant exclusive lanes. However, the number of incidents on the freeway which make schedule reliability difficult and the need to establish greater transit identity make the Busway extension, a necessary element of the total plan.

The Pasadena Freeway - The establishment of an exclusive lane on the Pasadena Freeway is recommended to serve the residents of the northern sections of the West San Gabriel Valley. The exclusive lane would be operated as a contra-flow lane in the peak A.M. and P.M. hours and connect to Hill Street in the Los Angeles CBD.

The details of the Pasadena Freeway contra-flow lane are set forth in the report "A Comprehensive Preferential Lane for High-Occupancy Vehicles." Caltrans no longer requires the buffer lane between contra-flow and normal traffic, therefore two off-peak directional lanes would be available making the Pasadena Freeway Busway lanes a viable and efficient program.

Park-and-Ride Lots - Parking facilities need to be situated where they are convenient to motorists approaching the San Bernardino Freeway or other bus-priority highway and where buses can get immediate access to the Busway or freeway. The lots should be located close to the point where large numbers of commuters enter the freeway, in order that the presence of the lot will be felt by enough potential users to justify frequent bus service (headways of 10 minutes or less at peak periods.) Lots should be large enough to absorb the cars of all commuters who might reasonably want to park and they should not be so large as to contribute to serious congestion during periods of peak use, nor so big that users must walk unreasonable distances to reach the commuter buses.

Of the 360,000 daily work trips to the center of downtown Los Angeles (180,000 workers), approximately 32,000 begin or end in the San Gabriel Valley communities. The El Monte Busway presently traverses this area, with pedestrian access to the

hospital and university stations and access by buses at Del Mar Avenue and El Monte Station.

The Bus Plan for the San Gabriel Valley calls for extension of express bus services to two major new stations. One station would be located near the Covina-West Covina boundary in the vicinity of Citrus or Barronca Avenues, and the second would be located in Pomona. Park-and-ride facilities for commuters and others who desire to use the Busway transit vehicles should be provided at other principal park-and-ride stations located near access points where "significant" numbers of commuters enter and leave the freeway.

What constitutes a "significant" number of commuters? - Studies of commuter travel in Philadelphia, Washington, D.C., and other large cities[12] have found that up to half of the commuters with cars available for work trips will leave their cars at home or on a park-and-ride lot if the door-to-door trip can be performed as quickly on the bus as by driving. Out-of-pocket cost savings (in addition to the time savings) can also be expected to induce more bus use.

Park-n-ride lots therefore, are suggested for consideration at the general locations indicated in Figure 27. The number of daily commuters within the approximate "service area" of each lot has been determined based on analysis of origin-destination surveys and short-term projections of trip patterns. At all the lots shown, the tributary population of daily commuters to downtown Los Angeles is estimated to exceed 500 persons at the present time.

[12] Patterns of Car Ownership. Trip Generation and Trip Sharing in Urbanized Areas, Wilbur Smith and Associates for USDOT, BPR, 1968.

If the proposed service is carefully planned and well-executed, it is expected that approximately 20 to 40 per cent of the present CBD commuters in each of the "service areas" might be induced to board buses at the park-and-ride lots, assuming "normal" conditions -- no gasoline emergency or fuel rationing. If fuel prices and/or downtown parking costs should continue to rise, while bus fares remain constant, a higher proportion of the commuters would be expected to choose the bus. Emergency conditions, such as another fuel crisis, would not only attract more commuters to the lots, but would also encourage many other tripmakers to use buses; it is not regarded as feasible to attempt to provide sufficient parking facilities for all who might want to use them under such conditions. In such event, the limited number of transit vehicles available at peak periods would not be expected to meet the potential demand.

Over the longer term, if congestion continues to build up on the freeways, and if the Busway is extended further to the east, the proportion of downtown bus commuters from the East San Gabriel-Pomona areas could be expected to increase and the amount of time savings grows, with buses possibly, handling more than half the worker travel to and from downtown Los Angeles.

All-Day Service to Parking Lots - Park-and-ride lots for commuters, as mentioned earlier, can afford to supply short-headway service only during the peak commuting hours in morning and evenings. It is very desirable, though, that buses also give access to each lot throughout the rest of the day so that commuters who want to return their cars earlier or later than the hours of peak service can do so; otherwise, some persons with irregular hours or whose schedules are subject to change will be reluctant to use the lot. Such off-peak access can usually be provided from local routes that pass near the lot.

Parking Lots for Non-Commuters - The bus stations located on the El Monte Busway and the San Bernardino Freeway east of El Monte will enjoy high levels of bus service throughout the day when the proposed bus plan is implemented. They will, therefore, offer attractive accommodations to non-commuter traffic in the freeway corridors, even though the time advantages that accrue to Busway users at the peak will not apply when cars can move freely in relatively light volumes of off-peak traffic.

THE PARK-AND-RIDE LOTS

Fourteen locations have been identified for a system of park-and-ride lots in the San Gabriel Valley. All sites are in the vicinity of access ramps to a freeway leading to downtown Los Angeles. Nonstop express buses operating from most lots would use all or a portion of the El Monte Busway and would deliver commuters from their homes in the Valley to jobs in central Los Angeles as quickly as the trip could be made by car, on a door-to-door basis. The tentative lot locations are listed in Table 30.

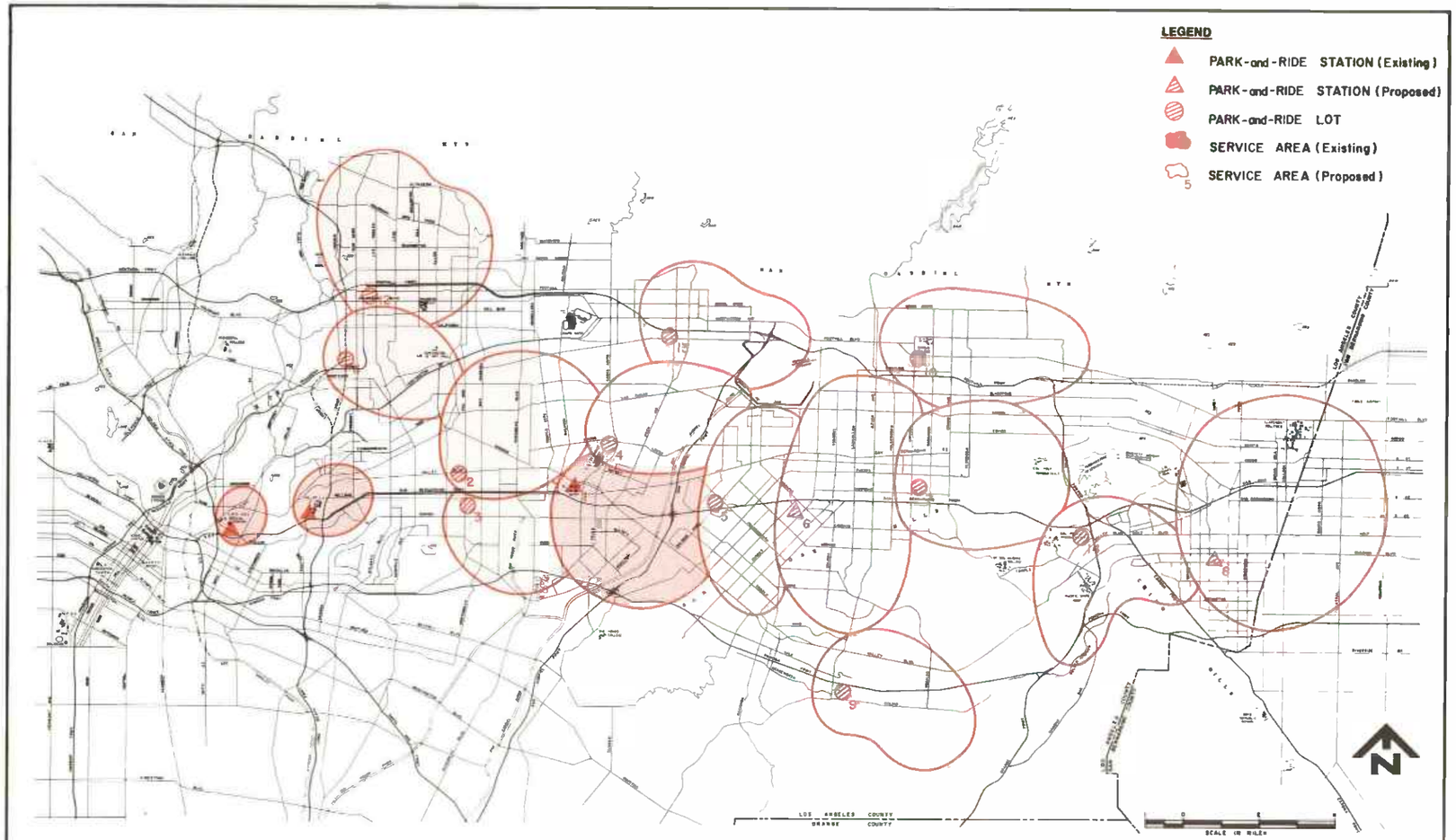
There are park-and-ride facilities in at least three of the suggested sites at the present time. These are the El Monte Station, where over half of the ultimate 1,400-car lot is presently in use; an outdoor theater used for park-and-ride during daylight hours near Del Mar Avenue and Valley Boulevard; and a municipal lot in the Pasadena Civic Center which was recently made available for commuter parking by persons using a new express bus service into the Los Angeles CBD via the Pasadena Freeway.

Of the eleven remaining sites, one is proposed for development in South Pasadena (for access to the Pasadena Freeway); one in Glendora near a ramp to the Foothill Freeway, and one in the La Puente Shopping Mall with access to the Pomona Freeway. The rest are in the San Bernardino Freeway corridor near principal access points. (Figure 28).

The main features of each of these sites are:

Lot Number 1 - El Monte Station - A 1,400-car lot is soon to be completed at this location (about half of the spaces are already built). Drivers also park at curbs and "informally" off-street in the bus terminal area, with up to 1,000 parked cars counted in the lot and surrounding areas. This is the only station thus far constructed for the sole use of drivers who transfer to buses for the trip into Los Angeles from the San Gabriel Valley. Since the number of cars parked at the station regularly overflows the lot, it is not possible to determine, from lot occupancy counts, the number of cars that would need to be accommodated if everyone who wished to park in the lot could do so. This condition will not change until enough more spaces are built at this location to meet the needs of all riders, or other parking fields are located to intercept some of the drivers now using the lot.

The El Monte Station lot is different from most commuter lots, in as much as the passage of buses through El Monte Station makes the lot accessible by express buses to and from Los Angeles at frequent intervals during most hours of the day and night. The lot therefore, should be attractive to tripmakers other than commuters. However, the lot is regularly filled early in the day and very few late arrivals are able to find a space in which to leave a car. This condition should be modified so that some space will be available for non-commuters under nearly all conditions. This could be achieved by placing an appropriate charge on the use of parking space, sufficient to discourage some commuters, but not too large for occasional riders.



LOCATION OF PARK-and-RIDE LOTS AND SERVICE AREAS

SAN GABRIEL VALLEY

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Figure 28

Table 31

PROPOSED PARK AND RIDE LOTS IN SAN GABRIEL VALLEY

LOT NUMBER	NAME AND LOCATION	NUMBER OF PARKING SPACES
1	El Monte Station - The present lot is under construction (half of lot is presently in use), in El Monte.	1,400
2	Del Mar Avenue, North - Park-n-ride to be located near Valley Blvd. (drive-in theatre lot presently used at this location for commuter access to El Monte Busway via Del Mar Avenue ramp.)	500
3	Del Mar Avenue, South - Lot near Del Mar Avenue and main east-west street south of San Bernardino Freeway (for access to Busway via Del Mar Avenue ramp).	500
4	Arcadia-Temple City - Lot in vicinity of Lower Azusa Road and Santa Anita Avenue; express buses to Los Angeles via El Monte Station.	400
5	Baldwin Park - Lot in vicinity of Baldwin Park and Francisquito Avenues; express buses to downtown Los Angeles via San Bernardino Freeway and busway.	400
6	West Covina - Major new transit station to include spaces for autos in vicinity of Sunset and Pacific Avenues; express buses to downtown Los Angeles via San Bernardino Freeway and Busway.	800
7	Eastland - Lot north of freeway in vicinity of Rowland and Barranca Avenues; express buses to Los Angeles via freeway and El Monte Busway.	500
8	Pomona - Major new station for express (non-stop) buses to downtown los Angeles via freeway and El Monte Busway.	500
9	Puente Hills Mall - Use existing lot with new express bus service via Pomona Freeway to Potrero Grande Drive and Del Mar Avenue to El Monte Busway to Los Angeles.	350
10	Glendora - Lot in vicinity of Citrus and Mauna loa Avenues; express bus to Los Angeles via Foothill Freeway, San Gabriel Freeway, San Bernardino Freeway, and El Monte Busway.	350
11	Pasadena Civic Center - Municipal parking lot with express bus access to Arroyo Parkway and Pasadena Freeway into Los Angeles CBD.	500
12	South Pasadena - Lot in vicinity of City Hall for express bus service to downtown Los Angeles via Pasadena Freeway.	300
13	Azusa - Lot for up to 250 cars in vicinity of Foothill Blvd. and Azusa Avenue.	250
14	Cal Poly Pomona - Parking facilities to be located near Valley and Pomona Blvds.	200

Inasmuch as parking in the El Monte Station lot is free at the present time, the savings to motorists who park there and ride the bus to downtown Los Angeles are both in time and money (parking lot fees and operating costs of the car vs. a 50¢ round trip by bus), the parking charge might have to be quite high if a substantial portion of the lot is to be kept open. However, this situation would be substantially relieved if free parking were supplied at other intercept points, strictly for commuter use. In that case, a modest charge (perhaps 50¢) would tend to keep part of the lot open for midday use. The charge might apply to only a portion of the lot, if surplus capacity resulted from placing a fee on all parking in the lot.

Lots Number 2 and 3 - Del Mar Avenue Lots - Two lots are proposed for development in the vicinity of Del Mar Avenue access ramps into the Busway. One lot should be located to intercept commuters approaching the freeway from the north, the other should be situated on approaches from the south. Since the time advantage to peak-hour commuters entering the Busway at this point would be nearly as large as at the El Monte Station (serious congestion on the San Bernardino Freeway at the morning peak period presently begins at about this point), drivers parked in commuter lots should be able to realize the same slight savings in door-to-door trip time, thereby assuring good use of the lots. Population densities in the vicinity, and the high proportion of CBD-oriented workers, relative to areas east of this point, should generate good demand for the park-and-ride service.

An outdoor theater near the intersection of Valley Boulevard and Del Mar Avenue presently is used by commuters who board the bus service operating on Valley Boulevard. Inbound buses proceed directly from the lot to the El Monte Busway via the Del Mar Avenue ramp. While only a few buses presently serve the lot during the morning commuting hours, local service will be improved with the proposed new bus line on Del Mar Avenue. The plan calls for service on the new line to operate on 10-minute headways during peak periods, thus, assuring short waiting time for commuters desiring to enter the Busway.

It is suggested that parking for up to 500 cars might be provided in this vicinity. If arrangements can be made with the drive-in theater to secure the needed space allocation on a long term basis, this should prove satisfactory.

A similar lot should be considered in the vicinity of Del Mar Avenue and Garvey or Graves Avenues to the south of the San Bernardino Freeway, if a suitable open space can be found for this purpose. A location somewhat further removed may be necessary, with the principal requirement that it be situated on main approach streets to the freeway so that commuters will not have to deviate far from their normal paths to reach the lot; bus access from the lot to the Busway ramp on Del Mar Avenue should be direct and fast to avoid introduction of traffic signal or congestion delays that would make the lot unattractive to commuters intent on making the trip in the shortest possible time.

Lot Number 4 - Arcadia-Temple City - A lot for up to 500 cars in the vicinity of Lower Azusa Road and Santa Anita Avenue would intercept a heavy flow of commuters oriented towards the San Bernardino Freeway. A lot at this location would be expected to divert a significant number of parkers from the overloaded El Monte Station lot, with no sacrifice of time savings if express buses operated out of the lot directly to the Busway on headways of no more than 10 minutes during the morning rush. More than 1,000 daily commuters are estimated to live within the areas immediately tributary to a lot at this location; up to half of these might be expected to

use buses from the lot, either as drivers or "kiss-and-ride" passengers, if high quality service is maintained. Others who work in the Wilshire corridor and other areas tributary to downtown Los Angeles could also be expected to take advantage of express bus services operated from the lot.

Lot Number 5 - Baldwin Park - A lot for up to 500 cars in the vicinity of Baldwin Park and Francisquito Avenues would be accessible to approximately 1,000 workers who commute daily to the Los Angeles CBD. Express buses should operate directly from the lot to the San Bernardino Freeway via the Francisquito Avenue ramps and into the El Monte Busway. Up to half of the persons who work in downtown Los Angeles might use the lot if the express buses can achieve average door-to-door times that are equal or superior to performance of the private car. At current low transit fares, a substantial daily savings in parking fares and operating costs would be realized by all parkers.

Lot Number 6 - West Covina - A freeway station is proposed in the vicinity of Sunset and Pacific Avenues, in the West Covina Civic Center area. A 500-car transit station similar to the El Monte Station, in this location and developed primarily for commuters into central Los Angeles, but with some spaces reserved for non-commuter use would appear to have good potential. Express buses for commuters should originate at the station on frequent (10-minute or less) headways during the morning peak period, with equivalent return service in the afternoon. Buses would run non-stop, by-passing the El Monte Station and entering the Busway directly from the freeway. Utilizing the preferential bus lanes until they reached the Busway, they should maintain speeds above the car and should therefore realize the same overall time advantage as other users of the Busway.

Approximately 1,000 daily commuters to downtown Los Angeles reside in the areas tributary to this lot thus, assuring a reasonable reservoir of demand from which to divert to the lot. Because of the distance between West Covina and some of the West San Gabriel Valley communities, commuters and others destined to places short of central Los Angeles would be expected to make modest use of the semi-express bus services operated from the proposed new station along the San Bernardino Freeway.

Lot Number 7 - Eastland - A freeway bus stop is proposed in the vicinity of Eastland Shopping Center in West Covina. A commuter parking lot with up to 500 spaces should be capable of attracting substantial use by workers destined to downtown Los Angeles via the San Bernardino Freeway and the El Monte Busway. Peak hour services from the lot would need to be operated on short (10 minutes or less) headways in order to attract a sufficient number of the more than 1,000 daily CBD commuters who live within reasonable distance of this general location, to justify a facility of these dimensions.

As with other freeway bus stops, the number of buses passing each hour would be expected to attract a flow of non-commuter traffic throughout the day and evening hours. For this reason, a portion of any parking lot constructed for bus riders should be reserved for non-commuters, should the commuter traffic tend to saturate the lot.

At an early stage in the development of a new freeway bus station, it may be expedient to allow some space for bus riders to park in the Eastland Shopping Center. However, the amount of parking area which may be required is more than a shopping center is usually willing to relinquish for this purpose; in any case, long range development of a parking program can proceed most effectively if single purpose parking lots are the basis for the program.

Lot Number 8 - Pomona - It is estimated that up to 1,000 persons from the Pomona area and portions of San Bernardino County commute into Los Angeles on the average weekday. Non-stop express bus service from a commuter parking lot near an access ramp to the San Bernardino Freeway, at an attractive fare, with no charge for parking would provide considerable economic and time savings to many of these East Valley residents. In addition, express bus users would be saved the driving task and the delays in congestion usually experienced in the daily commute by car.

Although there is considerable parking space available at the bus station in Pomona, the station is not well planned for convenient pedestrian trips of quick access to the freeway. It is suggested that a new station with parking lot for up to 500 cars be developed. The new station should be designed to adapt to the planned development of downtown Pomona.

Lot Number 9 - Puente Hills Mall - The proposed bus plan incorporates a new Route (No. 418) which enters the Pomona Freeway after leaving the Puente Hills Shopping Mall via Azusa Avenue, and proceeds west to an interchange at Maryland Drive and Potrero Grande Drive, to Del Mar Avenue and into the El Monte Busway via the Del Mar Avenue ramp. It is proposed that this service operate express from the shopping mall to Del Mar Avenue, make only two stops on that street before entering the Busway, and proceed express into downtown Los Angeles. A 20-minute service or less may be justified during peak periods. Inasmuch as the number of centrally-oriented commuters in the areas tributary to the shopping mall are relatively few, commuters desiring to use the service might be accommodated in the Mall lot, if the managers of that facility are agreeable. In the event that the service attracts more users than can conveniently use the shopping center lot, a new facility should be planned; this is likely to have longer-range implications.

(Note that new Route No. 418 operates in local service from Pomona to Puente Hills Mall.)

Lot Number 10 - Glendora - A lot for up to 500 cars is suggested for the vicinity of Citrus and Maunaloa Avenues in Glendora. The lot would provide a transfer point for persons commuting to downtown Los Angeles from areas to the north and east. It is estimated that 700 to 800 persons make the round trip into Los Angeles for work each weekday from the areas tributary to this location. Commuters would be accommodated in non-stop express buses via the Foothill Freeway, the San Gabriel Freeway, and the San Bernardino Freeway to the El Monte Busway. This service should be able to sustain the door-to-door time savings attributed to other express buses routed over the Busway.

Lot Number 11 - Pasadena Civic Center - A new service has recently been inaugurated by SCRTD which provides express buses for commuters between the Pasadena Civic Center and downtown Los Angeles via the Arroyo Parkway and the Pasadena Freeway. Commuters park in a city lot.

Lot Number 12 - South Pasadena - A lot for 500 or more cars could be used in the area north of the city hall in South Pasadena; express buses operated from such a lot would enter the Pasadena Freeway at the Glenarm Street access to the Arroyo Parkway. Full advantage of express bus services from such a lot could best be developed by operating buses in contra-flow lanes during peak periods, with buses entering downtown Los Angeles via Hill Street, as recommended in an earlier report.*

*A Comprehensive Plan of Preferential Facilities for High-Occupancy Vehicles, Wilbur Smith & Associates, March, 1974.

Lot Number 12 will serve essentially the same area as the Pasadena Civic Center lot. There is a large volume of downtown work travel from the whole area, and a special express bus service from a large commuter parking lot should do well if the contra-flow concept is adopted. Because existing land uses are fairly intensive in this area, and open space for a very large lot may be difficult to find, two or more smaller lots may have to be used. Some efficiency in bus transport is lost if the buses must make two stops, or if longer headways are fitted to the lower level of demand that small lots develop.

Lot Number 13 - Azusa - A lot for 250 or more cars could be used to serve the Azusa-Glendora area. Route 410 would serve this area and travel along Azusa Avenue to the freeway.

Lot Number 14 - Cal Poly Pomona - A 300 to 500 car facility could be developed along Valley Boulevard and Pomona Boulevard to serve Los Angeles and West Valley destinations. Route 416 would make a stop at this location after leaving the downtown Pomona Station and provide direct service to the El Monte terminal and Los Angeles.

DEMAND-RESPONSIVE TRANSPORTATION

Demand-responsive transportation services are recommended as a limited and supplementary form of public bus transit in the San Gabriel Valley. These services are designed to augment the expanded and improved fixed-route transit and express bus plans that have been developed. As a supplementary service, demand-responsive transit was examined in a variety of forms, each of which have potential selective application at one or more places in the Valley.

It was not regarded as desirable for a demand type of transit service to be instituted to replace fixed route services if such change would not result in appreciable increases in bus patronage, or in cheaper operation costs, overall. Where greater use or cheaper costs would result, however, the use of a demand-responsive service has been identified as a possible alternative to, or modification of, the fixed route system.

The demand-responsive systems can be tailored to a number of conditions:

- Shuttle services (many-to-one) between residential communities and line-haul fixed-route transit--the San Bernardino Freeway routes, connecting to the El Monte Busway, are the prime example of this potential in the Valley; such services might be introduced at a number of points along or near the Freeway.

- Subscription services for commuters to concentrated areas of employment, within the Valley and to the Los Angeles CBD.

- Complete transit service for selected low-density communities. These services might include fixed-route or many-to-one shuttle services during peak periods, interfacing with freeway buses or other routes; off-peak and evening services in the many-to-many mode.

- Substitute for fixed-route services after the evening peak period, in areas of low patronage, or in which residents seek the security of door-to-door transportation and surveillance.

- Special para-transit services, particularly during midday and evening (off-peak) hours. Could include use of special vehicles equipped to handle wheelchairs, and other travel aids.

Shuttle services of the many-to-one variety, and subscription services for peak-period commutation can be tailored to market demand and, if the market is not there, can be discontinued or transferred to other areas with relatively less difficulty than services of the other types mentioned.

The institution of a completely new transit service in areas not presently accessible to any direct transit system poses an initial problem of market definition--how many persons can be expected to benefit from, or take advantage of the new facilities? An answer to this question is needed, because failure to supply enough transit service at the initial stage can result in demands which overwhelm the service, with resulting failure to meet commitments or inability to accept requests, thereby creating a poor image. Actually, this condition is less serious than the opposite one of overestimating demand, because equipment can be added to expand services, thereby taking advantage of certain economies of scale and possibly, improving system flexibility and efficiency, whereas, the opposite is true if services have to be cut back.

Estimating patronage levels is complicated by the variety of demographic characteristics and travel purposes which need to be given weight. The most likely candidates are those persons defined as "transit-dependent" according to certain criteria. These are the populations without driving licenses (mostly under 16 years of age, plus some elderly) or persons with licenses but no car to drive ("no-car" households, or persons in households where the car(s) is used by others). Also, in the case of "para-transit" services, the number of persons in particular population strata who meet requirements for the travel service, and the proportion of those who would be likely to use it in preference to other modes.

Besides the transit-dependent, however, there are persons with cars who may prefer transit because of economics (or time) savings, because of its convenience, because they dislike driving, because of its social acceptability (such as an express bus service which caters to the peer-group), or other reasons. The quality of transit in terms of availability and convenience (as well as cost) is critical in deriving ridership from these strata of the resident population in any community. (See Appendix A for discussion on transit-dependent populations.)

There are large differences in the demographic and economic compositions of populations in various parts of the San Gabriel Valley. Thus, the proportion of elderly persons in the older, more densely settled West San Gabriel Valley, is nearly three times as large as it is in the newly-developed areas in East San Gabriel Valley communities; that is partly because most newly-developing suburbs in any urban area contain a preponderance of young households and new families, and also relates to the presence of numerous small residential units in apartment houses and condominiums in West San Gabriel Valley which are largely lacking in the newer developments towards the east.

Another example is the proportion of households without cars, which are also about three times as numerous in the West San Gabriel Valley communities as they are in the East San Gabriel Valley. While this may relate somewhat to the numbers of elderly persons, and the lower levels of car ownership usually experienced in apartment dwellings, the low level of no-car dwellings in East San Gabriel Valley

communities is directly related to the lack of transit services there; a household needs a car in order to survive in areas without public transit.

What these relationships suggest is that where there has been no public transit, there are likely to be very few transit-dependent persons; although young people under driving age are sometimes labeled "transit-dependent", this is a relative term, since they expect and receive transportation from car-driving members of their households--they often do not perceive their "transit-dependency," and potential use of new transit may be very low from this group.

Trip Productivity to Support Demand Services - Each proposed new service was examined and evaluated relative to the trip potential of the community it is to serve, giving weight to the peculiar needs of the residents and the ability of the proposed service to meet those needs. As noted earlier, a rough measure of the success of an operation of this type is the average hourly "productivity" of the service in terms of number of persons carried per vehicle in service. A value of seven or more passengers per hour is regarded as satisfactory in most situations, while lower values have been accepted for services that are supplementary to other transit or provide transport for special classes of riders.

RECOMMENDED DEMAND-RESPONSIVE TRANSPORTATION SERVICES

A great amount of study has already been given to development of demand-responsive transportation in various parts of the San Gabriel Valley, as evidenced in the service inaugurated in Claremont in the Fall of 1974 and as set forth in the Jet Propulsion Laboratory's studies for Pasadena and the Los Angeles Road Department's "Alternative B" transit improvement plan for the Valley. While the scope of the present study does not permit detailed investigation and design of specific demand-responsive transportation services, the following demonstration projects are recommended to test two different approaches to the problem.

HACIENDA HEIGHTS DIAL-A-RIDE

An experimental dial-a-ride system is proposed for the Hacienda Heights area. The system proposed will serve a 4.5 square mile area which has a population of 19,228 persons. (See Table 32.) The percentage of population that is poor, with no vehicle, or elderly is well below the average for the study area. However, the younger age group composes almost half (45.7 per cent of the area's population, and represents a potential transit user population.

Table 32

HACIENDA HEIGHTS DIAL-A-RIDE AREA

San Gabriel Valley

Resident Population	19,228	
Area	4.5	square miles
Persons per Square Mile	4,273	
Persons Age 65 and Over	343	
Per Cent	1.8	
Persons Under Age 16	8,781	
Per Cent	45.7	
Persons with Income Less Than Poverty	193	(4.3 Per Cent)
No Vehicle Households	87	(1.9 Per Cent)
Labor Force	7,136	
Number Households	4,483	

The proposed system will be a many-to-one type service. In this type system, persons are picked up by a minibus type vehicle and delivered to a central point where connections can be made to fixed route lines to complete their journey. In this case,

the proposed focal point is the Puente Hills Shopping Center where connections can be made to five proposed fixed routes (412, 418, 464, 466, and 470) that would provide service to Los Angeles, Pomona, Azusa, Eastland Shopping Center, West Covina Center and the El Monte Station. This experiemental system will require only two vehicles and will have a maximum waiting time of 30 minutes to the dial-a-ride user.

MONTEREY PARK MINI-LOOPS

A minibus service is proposed for the hill sections of Monterey Park. The fixed route buses of RTD to provide quarter mile coverage to most of the community; however, the hill sections of the City are largely inaccessible to the residents due to the steep grades.

The population of the area is 26,515 per the 1970 Census of Population; 7.8 per cent or 2,067 persons are age 65 or over and 8,427 persons (31.8 per cent) are under age 16. The population density is 7,365 persons per square mile, 6.3 per cent of the households in the 3.6 square mile area (555 households) have no vehicle available. These statistics are shown in Table 33.

The hilly terrain and narrow, winding, residential streets of this area will require a special small type bus.

Initially, a two-way loop service would provide service between the hilly residential areas and the mainline RTD bus routes. Service would also be provided to the Atlantic Boulevard and Garvey Avenue business districts, the hospital, city hall, high school and East Los Angeles College. The mini-loops will provide all passengers with direct service to major generators and RTD mainline service in the City. (See Figure 6.)

Table 32

CHARACTERISTICS OF MONTEREY PARK MINI-LOOP AREA

San Gabriel Valley

Resident Population	26,515	
Area	3.6	square miles
Persons Per Square Mile	7,365	
Persons Age 65 and Over	2,067	
Per Cent	7.8	
Persons Under Age 16	8,427	
Per Cent	31.8	
Persons With Income Less Than Poverty	342	(3.8 Per Cent)
No Vehicle Households	555	(6.3 Per Cent)
Labor Force	12,704	
Number Households	8,826	

Three buses operating on a 30 minute headway in each direction would provide the service. If the service proved acceptable to the residents it would be expanded to serve the hill area east of Garfield Avenue.

MARKETING TRANSIT SERVICES IN THE SAN GABRIEL VALLEY

The recommended Bus Transit Plan for the San Gabriel Valley will provide a new opportunity to demonstrate the role of transit in increasing resident mobility and contributing to an improved urban environment. The El Monte Busway has proven that buses can provide effective competition with the automobile for downtown-oriented commuter travel. It will be important to highlight these and other facts of the proposed new service through a carefully planned marketing campaign. The new transit plan offers a chance to relate bus service improvements to a modernized system of routes and schedules.

The marketing program should focus on the new opportunities to share in fast bus transit throughout the Valley and should be broadcasted to all residents. This generalized treatment will help to make the public aware that something is going on which may be of interest. A very specific effort should be made within the tributary area of each of the major new improvements to acquaint the neighborhoods with the new service. Emphasis on such special features as free parking space in commuter lots and at-freeway stations, very frequent, non-stop service from the lots and overall trip times which are directly comparable, door-to-door, to the car; the savings in time that can be realized by using the Busway, versus car travel on the expressway portion of the trip should be made known. Also, the difference in monthly costs to a bus commuter for the part of his trip that takes place on the freeway network, as compared to the same trip by car; average operating costs and a range of costs relating to both the Volkswagen and the Cadillac can be shown, together with a range of monthly parking charges at different downtown locations.

These efforts should not be limited to the attraction of persons who go to central Los Angeles, but should examine and advertise the advantage of bus transit for access to areas within the Valley and other points where improved services are offered.

Marketing is only effective when it has something to sell and a population of potential patrons with whom to communicate. Then it is successful only if the representations it makes on behalf of the product are honest and not misleading. It is most effective when it can put the merits of its product into true perspective for its customers--so often, the customer is really not aware of the full range of features offered, nor how these relate to competing offers. All of these things apply to the marketing of transit, as well as to food or cars or any other essential product or service.

In the case of the new bus transit plan proposed for San Gabriel Valley, an interlocking variety of services are set forth; in a very real sense, the different types of service reinforce one another. The El Monte Busway services expedite the movement of all transit users through the Valley; improved frequencies on local services shorten trip locally and, by transfer to the Busway, may be even more effective as a time-saver on long ones; demand-responsive services not only would make transit accessible to more people, but will add to the hours of accessibility and improve travel speeds as well. Demand-responsive special services also open up travel by public transport to crippled or otherwise handicapped persons who might otherwise have limited travel opportunities.

Appendix

Table A

OPERATING STATISTICS OF EXISTING SYSTEM

San Gabriel Valley

ROUTE NUMBER	TERMINALS		FREQUENCY HEADWAYS (MIN.) PEAK	BASE	NITE	SAT.	SUN.	DAILY ONE WAY MILES	DAILY ONE WAY TRIPS	DAILY BUS MILES	REQUIRED BUSES A.M.	BASE	P.M.	NITE	SAT.	SUN.
11	East L.A.	S. Rosemead	60	60		1		7.0	23	338	2	2	2		2	
17	East L.A.	Monterey Park	60	60		1		6.9	23	308	2	2	2		2	
19	Glendale	Pasadena	30	60		70		13.7	33	700	4	3	4		1	
31	Hollywood	Lake&San Pasqual	40	40	40	40	60	21.5	49	2,076	11	10	11	4	6	5
31A	Hollywood	N.Y. & Allen	40	40												
38	Long Beach	El Monte		3T		3T	3T	34.0	6	206	1	1	1		1	1
52	LA Spring St.	Arcadia	30	60		40		18.0	36	2,116	16	7	18	2	4	2
52	LA Spr. St.	So. Arcadia	30	60	60	40	60		46							
52F	LA Spr. St.	Arcadia	5T						11							
53	LA Olive St.	El Monte	10	30	60	30	60	16.2	88	2,266	21	5	22	3	5	3
53F	LA Olive St.	El Monte	4T						7							
60E	RTD Spr. St.	S.B. Riverside	1T	1T				83.9	4	6,989	28	15	31	6	11	11
60F	RTD Spr. St.	Pomona, Riv.S.B.	60	60	120	60	60		32							
60G	RTD Spr. St.	Pomona, Upland	60	60	120	60	60		34							
60G	RTD Spr. St.	Eastland	15						18							
61	Long Beach	Monterey Park	60	60	120	60	120	30.2	29	1,138	6	6	6		4	3
61	Monterey Pk.	Pasadena	60	60		60	120		28							
64	Pomona	Pasadena	1T	2T		3T		28.8	8	268	1	1	1		1	
63M	LA Spr. St.	El Monte	20	60	120	60	120	15.3	46	1,813	16	5	16	2	5	3
63B	LA Spr. St.	El Monte	20	60	120	60	120		44							
63F	LA Spr. St.	El Monte	3T						6							
67	LA Spr. St.	Sierra Madre	30					26.9	8	2,325	13	7	12	3	6	5
Shuttle	San Marino	Sierra Madre	60	60	80	60	80		40							
68	LA Spr. St.	Glendora	60	60	80	60	80		40							
68	LA Spr. St.	Monrovia	30	60		60			20							
69	LA Spr. St.	Rosemead	30	60				12.8	32	481	3	2	3			
70	LA Spr. St.	Pasadena	20	30	60	40	60	14.2	64	2,268	15	9	17	4	7	4
71	LA Spr. St.	Pasadena	20	30	60	40	60		70							
79	Alhambra	Rose Hill Park	45	45		45		9.4	37	363	2	2	2		2	
80	Alhambra	El Sereno	30	40				2.5	50	153	1	1	1			
107	Highland Pk.	Altadena	30	40	40	40	60	7.4	52	465	3	3	3		2	1
108	Pasadena	Colorado					30	10.6	96	976	6	6	6	2	6	2
108	Pasadena	Rosemead	60	60		60										
108	Pasadena	Sierra Madre	60	60	40	60										
108	Pasadena	Monrovia	60	60		60										
109	Fair Oaks	Lake	15	20	40	30	40	8.3	104	1,031	7	6	7	3	3	2
110	Lincoln	Hill	20	20	40	30	40	9.0	60	888	5	5	5	2	3	2
119	Washington	Baldwin	30	30	30	30	40	8.2	66	776	4	4	4	1	4	3
133	La Puente	Eastland	60	60		60		13.4	24	393	2	2	2		2	
134	Peck Rd.	Whittier Sta.	60	60				6.8	28	363	2	2	2			
135	Cogswell Rd.	So. El Monte	60	60				8.7	24	176	1	1	1			
146	Upland	Ontario	90	90					8	216	1	1	1			
170	Azusa	Whittier	30	30	30	30	N/A		62	1,547	7	7	7	2	7	
192	Acadamy	Arrow-Orange Grove	30	30		80		6.7	54	482	3	3	3		1	
193	Westmont	San Jose	30	30		80		7.2	58	476	3	3	3		1	
195	Garey-South	Town-North	30	30		80		16.1	50	993	5	5	6		2	
196	Town-South	Valley-East	30	30		80			50							
401	Wilshire-Wilton	Pomona	60	60	120	60	120	37.2	34	3,724	18	7	16	2	6	2
401	Wilshire-Wilton	Azusa Ave.	15	60		60			50							
402	Wilshire-Union	Pomona	60	60	120	60	120	38.7	38	3,302	16	7	16	2	7	2
402	Wilshire-Union	Eastland	10	60		60			50							
403	LA-Olive/21	Rowland Hts.	15					29.2	20	1,704	12	4	13	2	4	
403	El Monte	Rowland Hts.		30	30	30			60							
404	LA-Olive/21	So. Arcadia	15	30				18.2	52	1,268	8	4	9		2	
404	El Monte	So. Arcadia			30	30			18							
405	LA-Olive/21	Temple City	15					17.3	18	957	8	2	8		2	
405	El Monte	Temple City		30	30	30			52							
		TOTAL						584.3	2,060	43,545	260	199	270	40	105	51

Table B

OPERATING STATISTICS OF PROPOSED SYSTEM

San Gabriel Valley

ROUTE	TERMINALS	VIA	ONE-WAY ROUTE MILES	ONE-WAY RUN TIME P	ONE-WAY RUN TIME B	HEADWAYS BUSES/HOUR P	B	N	SA	SU	NUMBER ONE-WAY TRIPS P	B	N	SA	SU	REQUIRED BUSES P	B	N	SA	SU	DAILY BUS HOURS	DAILY BUS MILES
400	Wilton Pomona	Busway	34.0	75	65	3	3	2	2	2	18	54	24	72	64	10	10	7	7	7	162	3,500
	Wilton Eastland	Busway	21.2	45		6					18					10					30	450
402	Hill Sierra Madre	Freeway	18.0	55	45	6	3	2	2	2	18	54	24	72	64	13	6	3	3	3	129	1,800
404	Union Sierra Madre	Busway	18.0	55	45	6	3	2	2	2	18	54	24	72	64	12	6	3	3	3	108	1,800
406	Wilton JPL	Busway	23.5	75	65	6	3	2	2	2	27	54	24	72	64	12	8	5	5	5	138	2,500
408	RTD San Bernardino	Busway	75.0	130	120	1	1	1	1	1	6	18	10	32	30	6	6	6	6	6	108	2,600
XP	RTD San Bernardino	Busway	70.0		90		5T					10					2				18	750
410	El Monte Monrovia	Peck	6.7		20		2	1	2	1		48	8	64	28		2	1	2	1	24	450
	Union Monrovia	Peck	22.8	55		4					12					6					18	350
412	El Monte Pomona	San Bernardino Road	22.0		50		2	1	2	1		48	8	64	28		4	2	4	2	48	1,300
	Union Pomona	San Bernardino Road	37.5	100		2					6					6					18	300
	Union Eastland	San Bernardino Road	25.5	70		4					12					6					18	350
414	El Monte Mall	Francisqito	12.5		35		2	1	2	1		48	8	64	28		3	2	3	2	39	750
	Union Mall	Francisqito	27.5	65		4					12					8					24	350
416	El Monte Pomona	Valley	20.0		45		2	1	2	1		48	8	64	28		4	2	4	2	48	1,200
	Union Pomona	Valley	36.0	80		2					6					6					18	250
	Union Walnut	Valley	25.5	65		4					12					6					18	350
418	El Monte Pomona	Diamond Bar	23.0		40		2	1	2	1		48	8	64	28		4	2	4	2	48	1,300
	Union Pomona	Diamond Bar	39.0	65		2					6					5					15	250
	Union Mall	Diamond Bar	26.4	50		4					12					5					15	350
420	Spring Altadena	Lake	16.3	60	50	3	3	2	2	2	18	54	24	72	64	7	6	4	4	4	99	1,600
421	L.A. Glendora	Busway	25.0	30	30	4T					8					2					6	400
422	Olive Arcadia	Huntington	16.0	60	50	3	3	2	2	2	18	54	24	72	64	7	6	4	4	4	99	450
424	Olive So. Arcadia	Las Tunas	15.7	60	50	6	3	2	2	2	27	54	24	72	64	10	6	4	4	4	108	1,600
426	Olive El Monte	Valley	13.1	55	45	6	3	2	2	2	27	54	24	72	64	10	6	4	4	4	108	1,400
428	Spring El Monte	Garvey	13.3	55	45	6	3	2	2	2	27	54	24	72	64	10	6	4	4	4	108	1,450
430	Spring Alhambra	Brooklyn	11.5	50	40	6	3	2	2	2	27	54	24	72	64	9	5	4	4	4	96	1,250
431/433	Monterey Park	Mini Loops				2	2	2	2	2											64	850
432	Highland Park El Monte	California	12.2	50	45	3	3	2	2	2	18	54	16	64	56	6	6	4	4	4	88	1,200
434	Glendale El Monte	York	14.8	60	55	3	3	2	2	2	18	54	16	64	56	6	6	4	4	4	96	1,500
436	Highland Park El Monte	Flair Park	19.4	65	60	3	3		2		18	54		48		7	7	5	5	5	114	1,450

Table B (Cont'd.)

ROUTE	TERMINALS	VIA	ONE-WAY ROUTE MILES	ONE-WAY RUN TIME P	ONE-WAY RUN TIME B	HEADWAYS BUSES/HOUR P	B	N	SA	SU	NUMBER ONE-WAY TRIPS P	B	N	SA	SU	REQUIRED BUSES P	B	N	SA	SU	DAILY BUS HOURS	DAILY BUS MILES
440	Hollywood Pasadena	Glendale	20.9	90	80	3	3	2	2	2	18	54	24	72	64	10	9	6	6	6	147	2,050
442	Glendale Pasadena	Foothill	14.5	55	50	2	2		2		12	36		48		4	4		4		48	750
441/443	Altadena Pasadena	Hill/ Lincoln	10.5	45	40	3	3	2	2	2	18	54	16	64	56	5	5	3	3	3	60	950
445	Altadena East L.A.	Cal State	14.0	65	60	6	3	2	2	2	27	54	16	64	56	13	7	5	5	5	132	1,400
	Mont. Pass Shuttle		3.2	10		4T					8					1					3	100
	So. Pasadena Exp.	Busway	9.0	35		4T					8					2					6	150
447	Long Beach Altadena	Atlantic	32.0	115	105	3	3	2	2	2	18	54	16	64	56	12	12	8	8	8	192	2,850
	Commerce JPL		13.8	50		3					18					5					15	300
450	Pomona Pasadena	Foothill	27.0	80	70	2	2	2	2	2	12	36	16	64	56	6	6	6	6	6	108	1,800
	Duarte Pasadena	Foothill	10.5	40	35	2	2				12	36				3	3				36	550
	Pomona JPL	Freeway	30.8	45		2T					4T					2					6	200
451/453	Sierra Madre El Monte	Rosemead Baldwin	23.2	75	70	3	3	2	2	2	18	54	16	64	56	8	8	5	5	5	116	2,100
452/454	Duarte Pasadena	Delmar Foothill	23.5	75	70	3	3		2		18	54		64		8	8		5		96	1,750
460	El Monte W. Covina	Valinda	11.8	50	45	2	2		2		12	36		48		4	4		4		48	600
461	El Monte Whittier	Rio Hondo	9.5	40	35	2	2		2		12	36		48		3	3		3		36	500
463	Baldwin Park Mall	Temple	9.0	40	35	2	2		2		12	36		48		3	3		3		36	550
465	Arrow Whittier	Vincent	16.0	60	55	2	2	2	2	1	12	36	16	64	28	5	5	5	5	3	90	1,050
470	La Puente Pomona	Colleges	19.0	65	60	2	2	2	2		12	36	16	64		5	5	5	5		90	1,250
471	Azusa Mall		10.5	40	35	2	2	2	2		12	36	16	64		3	3	3	3		54	700
473/475	Glendora W. Covina	Citrus	27.5	95	90	2	2	2	2	1	12	36	16	64	28	7	7	7	7	4	112	1,850
477	Glendora Mall	Grand San Dimas	23.5	75	70	2	2	2	2		12	36	16	64		5	5	5	5		90	300
480	W. Pomona Montclair		8.8	35	35	3	3	2	2	1	18	54	16	64	28	4	4	3	3	1	60	800
481/483	Pomona Claremont		12.5	50	50	3	3	2	2	1	18	54	16	64	28	5	5	4	4	2	76	1,150
482/484	Pomona Montclair		15.5	60	60	3	3	2	2	1	18	54	16	64	28	7	7	5	5	2	104	1,450
490/492	Upland Montclair		10.3	40	40	2	2		2		12	36		48		3	3		3		36	550
491	Upland Ontario		5.7	20	20	2	2		2		12	36		48		2	2		2		24	350
			1,153.9								754	1924	554	2504	1406	320	227	140	172	115	3,851	60,150
											3,232											