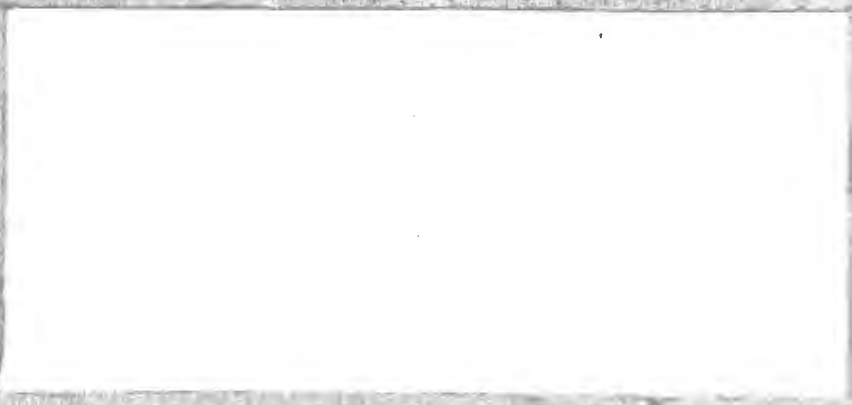

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# THIRD YEAR REPORT
# EVALUATION OF EXPRESS BUSWAY ON SAN BERNARDINO FREEWAY



Prepared for:

SOUTHERN CALIFORNIA ASSOCIATION OF GOVERNMENTS

By:

CRAIN & ASSOCIATES
Menlo Park, CA

May 1976

The preparation of this report has been financed in part through a contract from the U.S. Department of Transportation, Urban Mass Transportation Administration, under the Urban Mass Transportation Act of 1964, as amended.

This report has been submitted to Southern California Association of Governments (SCAG) as a consultant report, has not been reviewed by SCAG or other agencies and, thus, reflects only the consultant's findings and conclusions.

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7 June 1976

Mr. James Gosnell
Southern California Association
of Governments
600 So. Commonwealth Avenue
Los Angeles, CA 90005

Mr. Gosnell:

We are pleased to submit this Third Year Report evaluating the San Bernardino Freeway Express Busway. With the submission of this report, we have fulfilled all obligations under the existing contract which covers evaluation of the Busway in its Phase II (exclusive bus) operation. Pages 4 - 6 identify the required work steps and indicate where each is covered within the three annual reports. In the summary we have attempted to cover all evaluation findings, including those covered in earlier reports.

This report is submitted to you as a consultant report as agreed to in your letter to me dated April 12, 1976. We are generally pleased with the outcome of this evaluation effort. All required work tasks have been completed on schedule and on budget and to the apparent satisfaction of the Busway Committee representatives from SCAG, SCRTD, Los Angeles and Caltrans. Should you decide to evaluate the Busway in mixed mode operation, we will be pleased to continue to work with you. The evaluation plan as written covers the mixed mode phase.

John L. Crain

John L. Crain
Transportation Consultant

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## ACKNOWLEDGMENTS AND CONTRIBUTORS

This report has been prepared under the auspices of and with assistance from the Busway Evaluation Committee. Principal members of the committee during the period of this evaluation have been James Gosnell of Southern California Association of Governments; Daniel G. Miller and Patrick Conway of Southern California Rapid Transit District; Edwin Anderson, John Kenan, I.K. Zipperman, and Michael Gallagher of Caltrans; and L.L. Clearwater of the The City of Los Angeles Department of Traffic.

The report was written under the direction of John L. Crain, who also wrote the Summary and Chapters I and II. Sydwell Flynn, who designed and supervised all of the surveys reported herein, authored Chapters III, V and VI. David Koffman performed the mode split analyses and wrote Chapter IV. Appendix A was contributed by Daniel G. Miller and his staff at Southern California Rapid Transit District. Susan A. Kemp acted as research assistant and report coordinator. Barton Weitz planned the marketing analyses and performed the programming necessary for the computerized analyses using the Statistical Package for the Social Sciences. Nancy G. Walker edited the entire report.

# SUMMARY

## ABOUT THIS REPORT

This is the third and final report on the evaluation of the San Bernardino Freeway Express Busway in its current mode of operation, i.e., its exclusive use by buses. The First and Second Year Reports* provided comprehensive evaluations of operational and economic performance and public acceptance. The Third Year Report, which is narrower in scope than the preceding two, focuses on final measurements of ridership, final mode-split assessments, final marketing data on users and non-users, and evaluation of off-peak and reverse commuters using the facility. However, this section of the Third Year Report summarizes all the major findings of the three year evaluation effort, so that they are available in a single document as well as in the individual yearly reports.

This report completes the evaluation of the busway in its present mode and is preparatory to the final phase of operations in which buses will share the facility with carpools.

As a final note, this is a consultant's report to the Southern California Association of Governments, not a published document by SCAG. Thus, it has not been subjected to the governmental review and approval process; it is merely an advisory document provided to SCAG for its overall planning processes.

## THE BUSWAY

The San Bernardino Freeway Express Busway is an 11-mile, double-lane, exclusive roadway for buses running eastward

*First Year Report, San Bernardino Freeway Express Busway Evaluation, for Southern California Association of Governments, by Crain & Associates, February 1974; Second Year Report, San Bernardino Freeway Express Busway Evaluation, for SCAG, by Bigelow-Crain Associates, September 1975.

from Los Angeles. The busway lanes, which were built in the median strip of and, at some points, alongside the freeway, are physically separated by concrete and flexible barriers from those lanes which serve automobile traffic, making it a bus rapid transit system. This $57 million system is the most complete facility of its kind in the country, having off-line stations, park-ride facilities, double (bi-directional) bus lanes, feeder bus lines, and a downtown reserved (contraflow) lane. (See Figure 1.) Construction of the busway has been completed in stages, as indicated here. The final construction element--the addition of 700 permanent parking spaces at the El Monte Terminal, making a total of 1,700 spaces--has recently been completed.

| Element Completed | Date |
|---|---|
| E. Half of Busway | 1/73 |
| El Monte Station | 7/73 |
| W. Half of Busway | 5/74 |
| Hospital Station | 11/74 |
| College Station | 2/75 |
| El Monte Parking | 3/76 |

The completed busway offers a service that is competitive with automobile commuting on the semi-congested freeway. The running time on the 11.2 mile busway, including intermediate stops, is 14 minutes. All buses stop at the two intermediate stations if there are riders who want to get on or off. The basic fare is now $.50 per one-way trip. Earlier, when most of the data presented herein was taken, the fare was $.25.

After arriving in downtown Los Angeles, the buses leave the busway and circulate through the downtown area before returning to the busway. An exclusive, contraflow lane allows the buses to return to the busway entry point. In the suburbs the buses enter and leave the busway at several points, thus bringing direct service to a number of communities within the

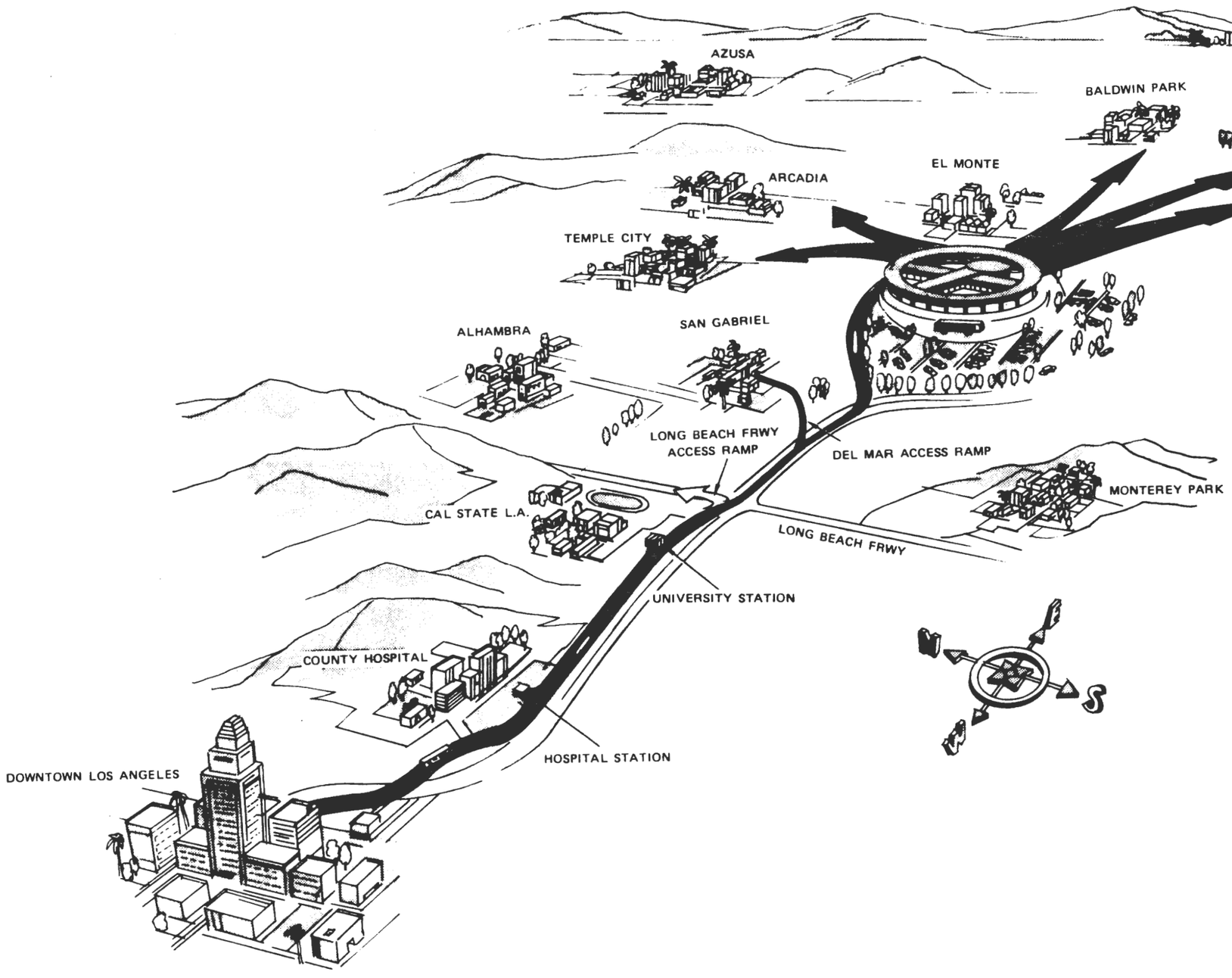



FIGURE 1 SAN BERNARDINO FREEWAY EXPRESS BUSWAY SYSTEM

corridor. However, most riders enter the system at the large park-and-ride facility at the El Monte Terminal.

## THE EVALUATION

The comprehensive evaluation of the busway has been carried out as a joint effort by the Southern California Association of Governments (SCAG), the Urban Mass Transportation Administration (UMTA), the Federal Highway Administration (FHWA), the California Department of Transportation (Caltrans), the Southern California Rapid Transit District (SCRTD), and the City of Los Angeles. Consulting services have been provided by Crain & Associates.

This three year evaluation effort has followed an evaluation plan which was adopted earlier by the participating agencies. This plan enables the findings to be related to another major national busway experiment, the Shirley Highway Busway in Washington, D.C., and to the planning of other bus priority systems in the Los Angeles Basin and throughout the country.

## FINDINGS

Below is a composite list of the three-year evaluation findings, some of which are supported by the analyses presented in this report; others by analyses given in the First and Second Year Reports. The authors thought it would be helpful to have all the major findings available in a single volume.

## Ridership Growth

Ridership has grown. There were 29 months of sustained ridership growth from the project's inception in January 1973 through mid-1975. At that time the major park-and-ride facility at the El Monte Terminal was filled to capacity, and growth ceased. --finding from Third Year Report

| Months After Busway Opened | Commuter Trips | Total Trips |
|---|---|---|
| 0 | 1,000 | 1,800 |
| 3 | 1,250 | 2,000 |
| 6 | 2,000 | 3,600 |
| 12 | 4,600 | 6,600 |
| 18 | 8,000 | 11,200 |
| 24 | 9,200 | 12,000 |
| 29 | 10,200 | 14,500 |
| 40 | 10,200 | 14,500 |

## Public Reaction

From the outset, general public reaction has been favorable to the busway concept. There has been a high level of public support for the busway from both users and non-users. As of November 1975, about 90% of those households surveyed thought the idea of an exclusive lane for buses was a good one. (It is worthwhile to note, however, that this facility, which added a new, clearly separate lane for buses, did not take a lane away from automobile traffic.) --from Third Year Report.

## Operational Feasibility

The busway in its exclusive bus mode has proved to be operationally feasible. SCRTD has mastered the problems of rerouting and rescheduling to incorporate the high speed busway runs into their total operation. Additionally, there have been no significant safety problems. -- from Second Year Report.

## Auto-to-Busway Diversion

The May 1974 on-board survey indicated that 75% of all busway users had formerly commuted by automobile. These riders were drawn from all auto submodes in about the same proportions that exist in the remaining freeway traffic. -- from Second Year Report.

| Prior Mode of Those Who Switched | |
|---|---|
| 50% | Drove alone |
| 13% | Alternate driver or carried passengers |
| 12% | Didn't make trip |
| 11% | Auto passenger |
| 10% | Non-busway bus |
| 4% | Other |

## Non-Users

Commuters who do not use the busway cited a variety of reasons for using other modes. About one-third claimed that they drove their cars to work because they needed to use them during the day. About 10-15% said that they did not use the service because they did not know where to catch the bus, or they simply dislike transit. The remainder felt that, for them, automobile commuting is more convenient and/or less expensive than public transit. These figures are consistent with the arrested growth in ridership; nearly everyone who can benefit by switching to busway service has done so. -- from Third Year Report

## Demographics

The bus system which operated in the corridor prior to the busway carried a ridership predominantly composed of transit-captive persons. With the busway, the ridership make-up has shifted and now about 80% are persons who have a choice between commuting by automobile or by bus. Another 9% could commute by auto but with some inconvenience to other family members. (See table, next page.) -- from Second and Third Year Reports

| | All Pre-Busway Users | Busway Commuters to Downtown | Busway Off-Peak Commuters |
|---|---|---|---|
| % Male | 36 | 45 | 55 |
| % 40 & Over | 55 | 48 | 34 |
| % Household Income Over $10,000 | 46 | 90 | 53 |
| % Transit Captive | 52 | 11 | 39 |

Diversion Effects

The auto-to-bus diversion effects are impressive. Each day, 5,500 one-way automobile commute trips are being eliminated, and three-fourths of the cars left at home are not being used for other purposes. There is a net savings of about 77,000 vehicle miles traveled (VMT) per day; this savings is about 13% of the VMT of the remaining peak-period auto traffic. There is a resulting daily savings of 6,000 gallons of gasoline, with an added daily consumption of diesel fuel by the busway buses. Relative to the environmental conditions which would have existed had there been no busway, there is a 15% reduction in pounds of air pollutants. --from Second Year Report

Market Share

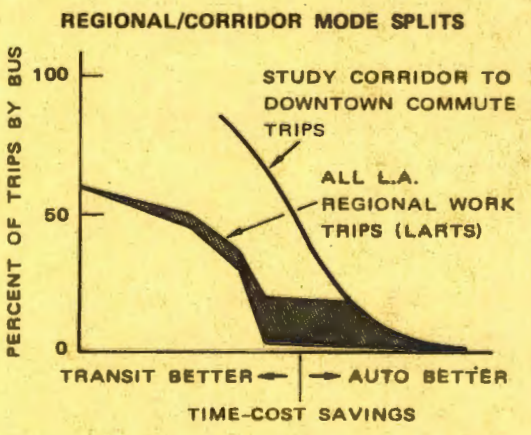
The transit market share in the San Bernardino Freeway Corridor has risen to and stabilized at 24%. This is the percentage of commuters who travel by transit to downtown Los Angeles from the eastern section of the corridor that is served by the busway. The vast majority of these riders use the busway service, although some use non-busway lines. The transit market share of commute trips to the CBD, the central part of the downtown area, is 28%. --from Third Year Report

## Mode Split Analyses

Commuters who have switched to the busway have done so entirely in accord with the economic theory which is generally accepted in urban transportation planning; that is, the probabilities of their choosing transit are well correlated with time and cost savings. The travelers who find they can obtain these savings are using the busway service in expected numbers.

The busway's success is a result of providing premium service to a particular market for which it is well suited, a market of suburbia-to-downtown commuters who are in a position to take advantage of this service. Over 70% use the park-ride access mode; over 85% are able to leave the busway service downtown and walk to their work locations.

The mode split computations show that, as long as the busway service is good--in terms of time and convenience--and it is provided at a reasonable cost, the busway form of rapid transit can attract riders in numbers similar to those using other forms of rapid transit.




Downtown commuters are a special market for which greater mode splits are achievable in comparison with other groups. This is shown in our mode split analysis, as it has been shown in similar analyses of travel patterns in other regions; the transit share of radial downtown commute trips at a given level of

transit time-cost advantage, is generally higher than what is obtainable for comparable trips throughout a metropolitan region. Simple aggregate mode split models do not adequately predict this difference, and two different curves are sometimes used to describe the two markets. However, more sophisticated models can encompass the factors needed to represent all trips within a single mathematical expression. --from Third Year Report

Time Series Analyses

The time series data clearly indicate that the installation of a busway service does not produce an immediate, sharp rise in transit patronage. Instead, the data exhibit a pattern of slow, linear growth which began with the inception of service and ended, 29 months later, when the El Monte parking lot was filled to capacity. Throughout the forty months of project service, various improvements were added--intermediate stations, additional bus lines and new entry points, additional parking spaces, reduced fares, etc.--each of which individually contributed to the ongoing growth in ridership. However, there were two periods of about nine months each when ridership growth continued as travelers slowly adjusted their patterns even though no significant improvements were added. Thus, this steady growth pattern demonstrates that a major transit improvement which significantly changes the balance of benefits between auto and transit commuting will be followed by at least nine months of transit ridership growth. --from Third Year Report

Capacity

The capacity of the busway varies at different points

within the system. Capacity was computed on the basis of alternative assumptions which led to minimum and maximum estimates. --from Second Year Report

| | Capacity seats/hour |
|---|---|
| El Monte Station (peak direction) | 8,000-10,500 |
| Along busway | 40,000-43,750 |
| Through intermediate stations | 6,000-13,000 |

Advertising

Because of its high visibility to the automobile commuter, the busway system tends to be self-advertising. Busway users indicated that they learned of the busway in numerous (and often multiple) ways. The most prevalent ways were through friends (38%), newspapers (22%) and seeing the bus on the busway (17%). --from Second Year Report

Off-Peak, Reverse Commuters

The May 1975 survey of other than peak-period, peak direction trips was most noteworthy in what it did not show, i.e., although planners often think of the typical off-peak user as a transit-dependent female, over 65, probably poor, and most often on a shopping trip, and the typical reverse commuter as a poor, minority, innercity resident, in search of employment in the suburbs, these stereotypes are not predominant on the SBFEB system. Rather, this survey showed the off-peak and reverse commute groups to be demographically strikingly similar to the peak-period, peak direction commuter group. The off-peak and reverse commute groups tend to be slightly less affluent and slightly more transit captive and use the busway

| | Off-Peak Riders | Reverse Commuters | Students | Busway Commuters to Downtown |
|---|---|---|---|---|
| % Male | 55 | 60 | 54 | 46 |
| % Under 40 | 58 | 62 | 92 | 60 |
| % Household Income Over $10,000 | 56 | 50 | 47 | 76 |
| % Transit Captive | 35 | 46 | 47 | 11 |

for a wide variety of purposes. A major portion of both groups is comprised of college students. --from Third Year Report

Use of Reverse Lane

The busway is a two-lane, bi-directional facility: one lane carries inbound traffic; the other carries outbound traffic. This is unlike the Shirley Highway Busway which operates both lanes inbound in the morning and outbound in the evening. Additionally, on that facility, carpools share the lanes with buses and there is some flexibility for passing.

At the present time, with over 90% of the SBFEB peak-period ridership traveling in the peak direction, the "reverse direction" lane operates at only a fraction of its capacity. When, in Phase III, carpools are added, the present design will be less flexible than the Shirley Highway Busway operation, because the two lanes are separated by physical barriers in many places. Thus, flexibility for passing will not be possible without major physical changes. Thus, the rationale for the bi-directional design concept is that it allows for convertability to a fixed guideway system, not that it is needed for today's passenger flows. --This is a general observation based in part on the off-peak analysis in this Third Year Report.

# I. INTRODUCTION

## BACKGROUND

The San Bernardino Freeway Express Busway (SBREB) is an 11.2 mile, two lane, exclusive roadway for buses, connecting downtown Los Angeles to the City of El Monte (see Figure 1). The busway, which is completely constructed and operational, is now in its second phase of experimental operations and, as such, is currently being used exclusively by buses. Ridership growth has now subsided making this final evaluation appropriate at this time. At a later time, the busway will be tested with a commingling of buses and carpools on its lanes.

The busway project is a major development in bus rapid transit, which is an alternative form of high speed, grade separated public transportation. A forerunner of this project is the highly successful Shirley Highway Busway serving downtown Washington, D.C., from the Virginia suburbs. Other busway and systems of reserved lanes and priority treatment for buses are under development in the Los Angeles Basin and in other cities; but the SBFEB is the most complete system in the country, equipped with off-line stations, park-ride facilities, bi-directional lanes, feeder bus lines, and a downtown reserved (contraflow) lane.

The project is part of the SCAG Short Range Transportation Plan, which includes transportation improvements aimed at improved air quality and energy conservation. These improvements include preferential treatment for high occupancy vehicles on freeways and major arterials, carpool action programs, transit development strategies, bicycle related programs, and commuter rail service. The San Bernardino Busway project has allowed

both an assessment of the effectiveness of selected transit strategies in attracting transit ridership and a determination of the overall impact of transit improvements on auto usage.

## CORRIDOR DEFINITION

The busway presently provides services to most of the San Bernardino Freeway Corridor, a residential traffic corridor east of downtown Los Angeles. This corridor is defined, for the purposes of this project, as that area bounded by the Los Angeles River on the west, by Azusa Avenue on the east, by Mission Road, Huntington Drive and Interstate 210 on the north, and by the Pomona Freeway on the south. The principal transportation artery serving this corridor is the San Bernardino Freeway. This corridor, as defined in this study, is approximately 20 miles in length and varies between 2.5 and 8 miles in width. Included are portions of approximately twenty-one separate municipalities as well as part of Los Angeles itself. Because the busway lines begin to the east of the corridor, the busway actually serves an area considerably larger than the project study corridor.

The corridor, which is suburban in character, encompasses about 35 square miles and houses a predominantly middle-class population. This includes about 190,000 households and about 22,000 commuters to the Los Angeles downtown area.

## PROJECT AND EVALUATION SCHEDULES

The busway project is subdivided into three phases. Phase I commenced with the opening of the partially completed busway on January 29, 1973. The second phase started on May 1, 1975, when the full system became operational. This phase was interpreted

as beginning when the last of the three stations was opened. Current plans are that Phase II, exclusive use of the busway by buses, will continue until May 1977, when Phase III commences with mixed mode operations. Currently, however, there is some pressure to commence Phase III earlier.

The evaluation also operates in these three phases, but, for the purposes of economy, is not continuous throughout the entire five-year period. No determination has yet been made as to what type of evaluation, if any, will be performed in Phase III.

## LONG RANGE OBJECTIVES

The original long range objectives of the evaluation were:

- To perform a cost-effectiveness evaluation of the busway under exclusive bus usage and under mixed mode usage
- To determine the feasibility and characteristics of the busway's mixed mode operation
- To determine the feasibility of providing three modes of transportation--auto, bus and rail--in a single corridor
- To establish a rational basis for planning future freeways incorporating mass transit facilities
- To determine the performance of alternate types of rubber-tired vehicles and communications and control systems suitable for use under these conditions
- To determine the effectiveness of and demand for fringe parking facilities in connection with the busway project.

Although interest in some of these objectives has varied over time, the evaluation has met all of those which relate to Phases I and II of the project.

## SCOPE OF PHASE II EVALUATION

The overall evaluation plan, published as a separate report, embodies a variety of tasks such as counts of bus rides and auto traffic, various surveys of public behavior and attitudes, and various analyses of benefits, costs, and operational performance. The objectives and activities of the Phase II evaluation are discussed below.

### Phase II Objectives

The objectives of the Phase II evaluation were:

1. To obtain a market analysis of the fully operational busway with exclusive bus coverage
2. To supplement the market analysis with data on mode split, benefits and costs, and commuter behavior relating to SCAG regional planning
3. To evaluate the trend in person-trip volumes on the fully operational busway relative to volumes on the adjacent highway lanes
4. To evaluate both the operational performance of the busway system and user reactions to features of the physical design, and
5. To study bus-auto interaction in the Los Angeles Downtown Area.

### Work Tasks

The Phase II work tasks were established in the evaluation plan published in December 1972. Subsequently, the work was reorganized into twelve tasks, as follows:

1. Coordination: This task encompassed all coordination with the committee and related agencies.
2. Time Series Analysis: This subsumed all analyses of transit and auto person-trip trends, causal factors, and cost-effectiveness.

3. Traffic Data Studies: This comprised all of Caltrans' work on traffic monitoring and analysis.

4. Transit Passenger Counts: This subsumed all SCRTD work on the counting and reporting of patronage and service levels.

5. On-Board Survey: This survey, conducted in the Fall of 1974, provided the principal data base for the Second Year Report.

6. Busway Cost Analysis: This provided an updated estimate of all operational and capital costs of the busway, identified by time and expenditure. Estimates were also made of bus operating cost per vehicle mile and per passenger trip reported on herein.

7. Operational Performance Study: This task dealt with the physical and operational performance of the bus system, which included the passenger throughput capacity of the El Monte and Hospital Stations, a bus time-and-motion study, a schedule reliability survey, a user perception survey of the three stations, and a bus operators' perception and attitudes survey. This task culminated in a system capacity study.

8. Bus-Auto Downtown Interaction Study: This was the Los Angeles Traffic Department's ongoing effort to measure the impacts of the busway on downtown traffic and mobility. The findings were covered in separate reports.

9. Off-Peak Survey: This survey of off-peak and reverse commute passengers, conducted in May 1975, emphasized non-work traveler benefits and economic benefits to inner-city residents. The findings are included in this report.

10. Household Survey: This survey, a repeat of the 1973 household survey reported on in the First Year Report, was conducted in October 1975. The results provide the final and most comprehensive assessment of mode split, market share, and causal factors on the final Phase II cost-effectiveness assessment. These findings are included in this report.

11. Second Year Report: This presented the evaluation findings through Calendar Year 1974 and the first quarter of 1975.

12. Third Year Report: This is the preparation of the present report covering evaluation findings for the last three quarters of Calendar Year 1975 and a summary analysis of the entire busway project.

## ORGANIZATION OF THIS REPORT

This report covers work completed during the third year of busway operations as well as all work not completed during the first two years. This final work effort, reported herein, is delineated below:

| Activity | Covered in: |
|---|---|
| Completion of Task 1--Coordination | All chapters |
| Completion of Tasks 2--Time Series Analysis, 3--Traffic Data Studies, and 4--Transit Passenger Counts | Chapter II |
| Tasks 5--On-Board Survey, 6--Busway Cost Analysis, and 7--Operational Performance Study | Second Year Report |
| Task 8--Bus-Auto Downtown Interaction Study | In a separate report. This task has been performed mainly by the Los Angeles Traffic Department. |
| Task 9--Off-Peak Study | Chapter VI |
| Task 10--Household Survey and its Analysis | Chapter III describes the survey; Chapter IV describes the mode split analyses; and Chapter V gives an analysis of the remainder of the survey data, herein referred to as "marketing data". |

# II. TIME SERIES ANALYSIS

## THE TIME SERIES DATA

Figure 2 is a time series graph showing busway transit ridership trends over the three years that the busway has been in operation. The transit ridership counts presented are counts of all passengers on busway buses passing the screenline at the Hospital Station on their way to or from the Los Angeles Central Business District (CBD). The busway buses are defined as lines 52F, 53F, 63F, 60, 401, 402, 403, 404, and 405. Descriptions of service levels on these lines are given in Appendix A and, more completely, in the Second Year Report.

There are three graphs presented in Figure 2. The top graph shows the total number of busway riders in both directions over the seventeen hours of operation on a weekday. The middle curve--which is the 5.5 hour peak-period, peak-direction count--shows the total number of persons riding inbound during the morning peak as well as all persons riding outbound during the evening peak. The bottom curve--which shows the two-hour peak-period, peak-direction count--gives the number of inbound riders during the morning peak hour (7-8 AM) and the outbound riders during the evening peak hour (4:40-5:40 PM).

## BUSWAY VS. FREEWAY VOLUMES

Over the past three years, we have attempted to relate the number of passengers on a busway lane to automobile travelers on one of the parallel freeway lanes. Comparable highway volumes are difficult to measure and interpret. However, the most relevant comparison would be between these auto

travelers and the middle graph--the 5.5 hour peak-period, peak-direction count. This is the time period and direction which best corresponds to freeway congestion, where greater capacity per unit of cost is needed.

Traffic measurements--volumes, occupancies, and speeds--were repeatedly taken over the three-year period (and were extensively reported on in the Second Year Report). In general, the complete facility carries an average daily traffic (ADT) count of between 140,000 and 150,000 cars per day. The 5.5 hour peak-period, peak-direction count for each freeway lane is 10,000 to 11,000 person-trips. This figure is based on periodic volume and occupancy counts (see data in Second Year Report). Thus, it would seem that the final, stabilized value of the busway's 5.5 hour ridership figure (10,000 person-trips) is comparable: a busway lane, operating in the peak period and in the peak direction, carries about the same number of persons as does a parallel highway lane. However, during the peak hour (bottom graph), a busway lane carries about 50% more riders than can be carried on a single freeway lane, i.e., 3,000 one-way person-trips for the busway lane versus nearly 1,800 for a parallel freeway lane.

## RIDERSHIP GROWTH

Some final comments are in order on overall ridership growth trends. First, the busway system has had growth in transit ridership in varying degrees through the first 29 months of operation, after which growth finally subsided in mid-1975. Data from surveys reported on in the Second Year Report show that, as of November 1974, about 80% of the busway riders had previously made their trips by auto.

During the initial period, January to July 1973, only the eastern half of the busway was constructed, and none of the stations were built. Traveler benefits were quite small, except for bus riders who rode regular transit prior to the opening of the busway. Thus, there was little growth in ridership. In mid-July, two major events occurred: the opening of the El Monte Park-and-Ride Terminal and a quadrupling of bus service capacity. With these improvements a high growth rate in ridership began and continued for nearly two years. During this mid-1973 to mid-1975 period, there were essentially no elements of the system operating at full capacity; i.e., patronage was free to grow until some constraint was reached or market saturation was attained. Improvements were added during this period, specifically, the addition of bus lines entering the busway at the Del Mar ramps, the completion of the western half of the busway, a decrease in fares to $.25, and the opening of the two intermediate stations. In mid-1975, the growth came to a halt, apparently because the El Monte Park-and-Ride was filled to capacity.

## SOME OBSERVATIONS

After three years of evaluating busway patronage, several observations are worthy of attention concerning character of ridership growth, peak and off-peak proportions, effects of fare changes, and impact on automotive travel.

### Character of Ridership Growth

There are two theories that are said to account for ridership growth on bus priority systems, namely, the "long, linear growth" theory and the "quick commuter response" theory. The

first is based on the idea that, given a condition where transit service is superior to auto travel in terms of perceived traveler benefits, commuters will slowly adjust their commuting arrangement, their life styles, and even their home or work locations to obtain these benefits. The second theory is based on a different view, that most commuters can adjust their travel patterns quickly and, within a matter of weeks, the vast majority of those who are going to switch to transit will have done so. This theory leads to an exponential growth curve, with considerable ridership increase in early weeks followed by an ever decreasing growth rate.

There seems to be support for both theories in specific circumstances around the country. However, the San Bernardino Freeway Express Busway seems to clearly support the "long linear growth" theory. Specifically, by early June, 1974, all of the substantial improvements were in place--the increased service level, the El Monte Terminal, the added busway runs entering through the Del Mar ramps, the reduced (25¢) fare, and the downtown, reserved contraflow lane. After that time, there were nine months of linear growth (excluding the three-month period when the SCRTD was on strike). At the end of these nine months, in mid-May 1975, the El Monte parking facility was filled beyond capacity and cars were parked in every available space on neighboring streets.

Within a few days after the addition of 400 spaces, the lot was once again filled to capacity. The time series data do not clearly indicate whether or not there was a corresponding increase in ridership. These additional spaces may have been filled by riders who had previously been forced to find parking space outside the El Monte lot. However, the current logical argument is that ridership is still constrained by the

capacity of the El Monte parking lot.

One can make similar arguments about the sustained growth between July 1973 and April 1, 1974, an eight month period when no major improvements were added to the system. The opening of the Del Mar ramps on January 1 added some riders but not nearly enough to account for all the growth during the first three months of 1974.

Thus, these data indicate that any major transit improvement will be followed by at least nine months of ridership growth.

## Peak, Off-Peak Proportions

It is interesting to note that the proportion of total daily busway trips that are peak-period, peak-direction trips has remained constant. Throughout the forty months of busway operation and ridership growth, the 5.5 hour peak-period, peak-direction counts have comprised about 70% of the total daily ridership. We have no comprehensive interpretation of this; however, it would seem that the busway system offers traveler benefits to both peak period and off-peak users, and that, although these benefits are obviously different in character, they have attracted a proportionate number of peak and off-peak riders. It is worthwhile to note that the time points where ridership growth started and stopped are similar for all three ridership time series curves.

## Effects of Fare Changes

During the course of the Phase II operations, there was a price drop from an average $.70 fare to a flat $.25 fare, which was subsequently followed by a rise to a flat $.50 fare.

These changes did not produce any ridership effects that are discernable in the time series data. People have cited (in the on-board survey reported in the Second Year Report) that "cost savings" was a major factor in their decision to use the busway. However, these time series data and the mode split analyses discussed later in this report suggest that costs are only one factor affecting diversion from auto to busway. For most people, that the busway is cheaper than (or competitive with) auto commuting is probably only a necessary condition for busway usage and not the central cause of their switch from auto to busway usage. Thus, we cannot conclude that price differentials of these fare changes have produced dramatic effects on busway ridership.

Impact on Automotive Travel

The time series data do not reveal the impacts of the diverted trips on the remaining automobile traffic flow. However, data presented in the Second Year Report show that this diversion has been a significant factor in increasing automobile speeds during the peak periods. Thus, because the busway lanes do carry their share of person-trips during the peak periods and because the remaining automobile traffic operates at increased speed, it seems clear that the overall performance of the freeway during the peak-period, peak-direction time has been improved.

# III. HOUSEHOLD SURVEY DESCRIPTION

## INTRODUCTION

### Purpose and Scope

The household survey was designed to sample those people living in the San Bernardino Freeway Corridor who regularly commute to downtown Los Angeles. The survey was to measure the mode split of these commuters and to ascertain why auto commuters who could use the busway do not. In addition, all houses contacted were asked two questions to determine their awareness of the busway and their general reaction to providing exclusive busway lanes.

The survey focused on peak period trips; off-peak trips were not excluded but are slightly underrepresented, making up less than five percent of the total trips in the sample. Nighttime commute trips were removed from the data since they reflect entirely different travel conditions.

### Operational Concept

The initial plan was to conduct a door-to-door search through preselected household clusters within the busway corridor and to find and interview approximately 500 commuters to downtown Los Angeles. This survey process, which was in operation for three weeks, produced about two-thirds of the needed sample. For several reasons, which will be discussed later in this chapter, the operation was then converted to a telephone survey to obtain the remaining one-third of the sample. The survey description included herein covers the door-to-door survey, the telephone survey, and the resulting combined sample.

## Origin and Destination Area Definitions

Except for the western boundary, the boundaries of the corridor were the same as those used throughout the evaluation: Huntington Drive and Interstate 210 on the north, Azusa Avenue on the east, and the Pomona Freeway on the south. The western boundary of the corridor had been the Los Angeles River, but this proved to be an unrealistic boundary in terms of potential busway riders. First, the College and Hospital Stations, which might appear to be the most convenient for residents of the far western section of the corridor, are not "walk-to" stations because they are not located in residential areas. Second, neither is a park-and-ride station. It was further reasoned that no commuter living in the far western end of the corridor, within a few miles of downtown Los Angeles, would be willing to drive as far east as the San Gabriel Park-and-Ride (by the Del Mar ramps) in order to ride the bus. It was therefore decided that the most logical western cut-off point would be Garfield Avenue, which is east of the Del Mar ramps but within reasonable backtracking distance for these commuters.

Trouble when go mixed mode?

The Los Angeles central area was subdivided into twelve destination zones (see Figure 3). Zones 4, 7, and 11 comprise the Central Business District (CBD).

## The Questionnaire

The questionnaire design, which was similar to that used in the 1973 household survey, was derived from the questionnaire used on the Shirley Highway Busway Project. It required about four minutes to complete.

The questionnaire was designed to measure:

- Mode split of downtown commuters
- Time and cost of individual commute trips
- Automotive and transit submodes
- Socio-economic profile of users
- Basic attitudes which affect disposition to using public transportation

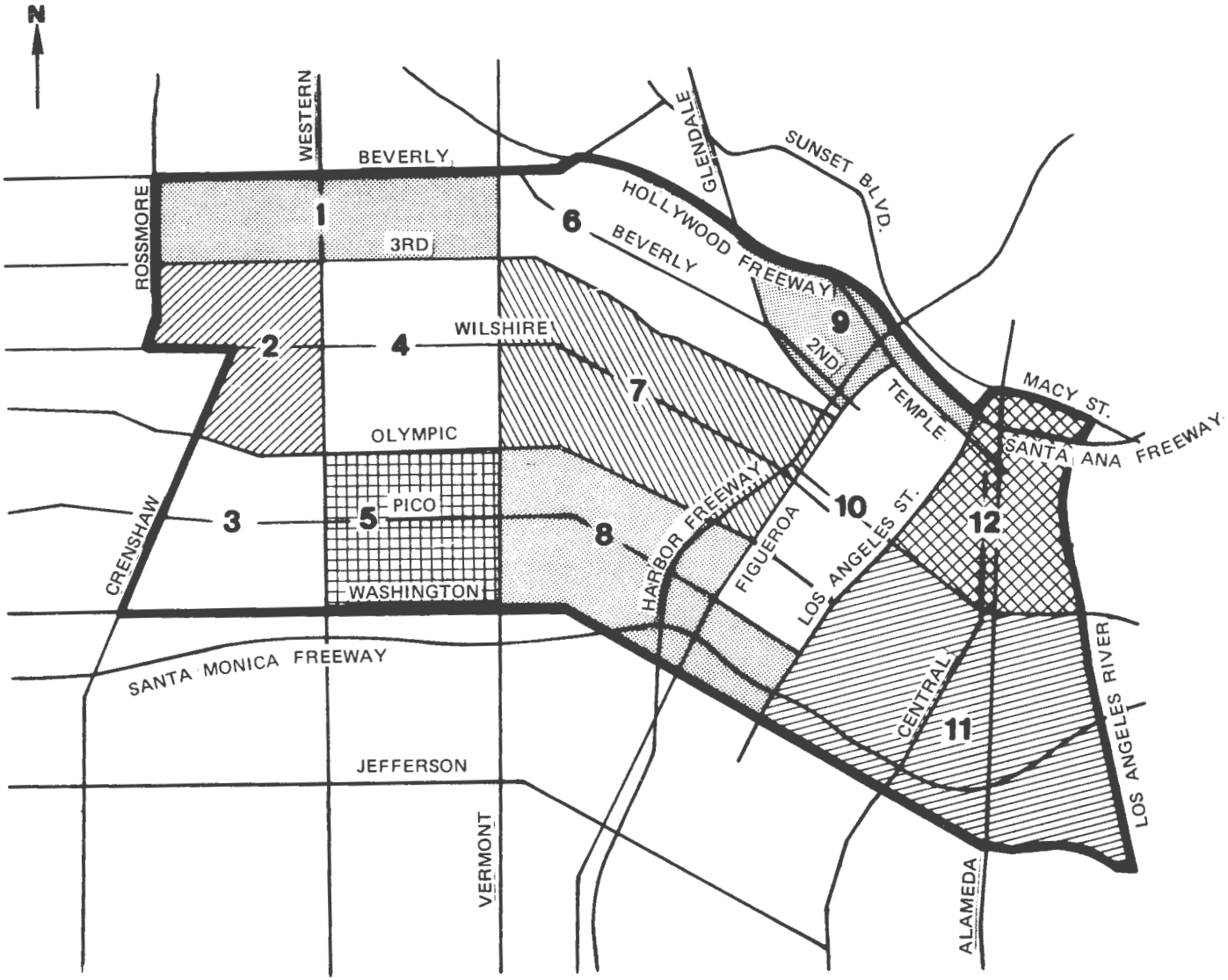



FIGURE 3 DOWNTOWN AREA ZONES

As such, the questionnaire was to provide data for a behavioristic or disaggregate mode split analysis (by soliciting time and cost data on individual trips) and to provide input for an aggregate analysis (by substituting standard times and costs for each cluster for the individual direct costs). The questionnaire is included in Appendix B.

## DOOR-TO-DOOR HOUSEHOLD SURVEY

### Sample Design

The initial survey technique employed a stratified, random, clustered household approach. Seventy-two households were drawn at random from the prescribed areas to act as lead houses for the 72 clusters that were to be approached.* Each cluster was to have about 85 houses, making a total sample of 6,000 households. The actual sample size resulting from the door-to-door operations is given in Table 1 on the following page.

Following the selection of the 72 clusters to be surveyed, District 07 of Caltrans was asked to run a computer tabulation of census data that described the total work trips between the 57 analysis zones within the corridor and the Los Angeles CBD. A check was then done to see how many clusters fell within each analysis zone and if there was a proper ratio between the number of clusters in a zone and the number of commuters within that zone. When such was not the case, adjustments were made. This, in effect, stratified the sample in terms of geographical distribution of commuters.

*It was initially thought that 72 clusters would be sufficient to produce the necessary 500 commuter sample. Later, this number proved to be insufficient, and additional houses were added for the telephone survey.

Table 1

BREAKDOWN OF HOUSEHOLD SURVEY SAMPLE

Houses Approached: 5,732

| No Contact Made | n | % | n | % |
|---|---|---|---|---|
| Not approachable | 143 | 2.5 | | |
| No one home and not contacted later | 884 | 15.4 | | |
| Refusal | 164 | 2.9 | 1,191 | 20.8 |
| Contact Made | | | | |
| Non-commuter households | 4,074 | 71.1 | | |
| Commuter households | | | | |
| Valid response | 342 | 5.9 | | |
| Non-response* | 125 | 2.2 | 4,541 | 79.2 |
| | | | 5,732 | 100.0 |

* In many cases, when someone was identified as a downtown commuter by another household member, a subsequent visit showed this not to be the case. Thus, a good percentage of the 125 non-responses were probably non-commuter households. Also, some downtown commuters did not mail back the questionnaires left for them. Finally, a small number of valid commuters refused to fill out the questionnaire.

## Field Procedures

The door-to-door survey began on October 12, 1975 and ran through October 30. Households were surveyed Sunday through Thursday, between 6 and 9PM. A team of twelve survey workers was hired through California State University at Los Angeles. Those who could speak Spanish were used, as needed, in clusters where a high percentage of Spanish-speaking persons lived. A team of two data takers covered a household cluster each evening, working on a house-to-house basis until an adult had been contacted in each of approximately 70 houses.

During the first week of the survey, if no one was home, a mail-back packet was left at the door. It contained a cover letter explaining the survey's intent, a questionnaire to be filled out by the downtown commuter (if there were one in the household), and a mail-back envelope. After the first week, the mail-back procedure was dropped because it was proving ineffective. In the second and third weeks, if no one was home, it was noted on the control sheet, and the house was dropped from further consideration. It was determined--partially on the basis of certain "special" clusters where not-at-home households were revisited and mail-backs were used--that this procedure was non-biasing. This will be further discussed in the section to follow in "Biases".

For houses where contact was established, after an introductory statement had been given (See Appendix B) three questions were asked:

- Are you aware that the busway has been built and is in operation?
- Whether or not you use the busway, do you think it is a good idea?
- Do you or other members of your household regularly work in the Los Angeles downtown area or in the Wilshire District?

If there was a "yes" response to the last question, one of several things happened:

- The commuter filled out the questionnaire;
- It was determined that the commuter did not work in one of the 12 zones designated as downtown Los Angeles (see Figure 3), and the interview ended;
- A questionnaire and explanatory letter were left for commuters who were not at home with a plan to pick the questionnaires up later or have the commuter mail them in; or,
- The household refused to be interviewed further.

When a commuter was identified, he or she filled out the questionnaire, with the help of the survey worker when needed. When there was more than one commuter in the household, questionnaires were obtained from each. When contacted commuters did not mail in their questionnaires, there was a telephone follow-up to homes where residents were willing to give their phone numbers. Telephone follow-ups were also made, when possible, to obtain missing data on completed questionniares and to clear up inconsistent information. This complete process produced contacts at 79% of the households approached and obtained valid questionnaires from 73% of the commuters identified in contacted houses. (This figure is probably somewhat understated; see footnote to Table 1 on page 18.)

Biases

A completed questionnaire was obtained in one of four ways: door-step interviews conducted on the initial visit; interviews conducted on follow-up visits in special clusters; mail-back returns from contacted households containing a commuter who was not at home at the time of the survey; or mail-backs returned from the special clusters and from households visited during the first week where no one was at home. Initially, it appeared that some of the techniques might be biasing; i.e., that a disproportionately high percentage of mail-back returns might have been obtained from either busway or automobile commuters, thus causing the mode split estimates to be overstated or understated. Procedures were therefore planned to check this.

These procedures included estimating the overall market share of commuters from the corridor using the previously mentioned census and ridership data. This figure was then compared with the market share obtained in the sample. Nine clusters were

designated as "special" clusters where all not-at-home households were to be revisited until the fraction of houses contacted in these clusters was brought up to 90%. The returns from the 773 houses contacted in the special clusters were then to be used to represent an unbiased estimate of the universe of the busway market share. Comparisons were then made, the results of which are shown in Table 2.

Table 2

EVALUATION OF SURVEY BIASES

| Data Base | Transit Market Share (%) |
|---|---|
| Ridership, Census Data | 28 |
| Total Sample | 24.1 |
| Special Clusters | 19.4 |
| Other Clusters | 24.9 |
| Doorstep Interviews | 25.0 |
| Mailed Back Questionnaires | 33.7 |
| Interviews by Telephone | 17.4 |

Based on census and ridership data, the estimate of transit market share for all trips to the CBD was 28%. The survey data show a market share of 24% for all trips to the downtown area, and 28.8% to the CBD. For the survey sample size of 474 trips, these estimates seem to be in excellent agreement. There are major differences in the various subsets of the transit market share (Table 2). The 33.7% transit market from the mailed back returns seems to be an overstatement; the 17.4% from the phone survey seems to be an understatement. Because these two biases (if they are biases) tend to cancel each other, we have elected to accept the entire sample and we believe that the 24% is reasonably correct, i.e., within a percentage point.

## Reasons for Change in Operations

The three-week door-to-door survey produced 350 valid questionnaires. This number represents 5.9% of the houses approached. Because the overall ratio of questionnaires to houses approached during the 1973 household survey was 7.2%, we had expected a higher ratio. We can only speculate on the reasons for a lower ratio in the more recent survey. First, the general political climate of our country has changed in the intervening two-year period. Revelations during the Watergate Trials have tended to make the public more cynical about government in general and about giving out personal information to government agencies. Second, the increasing crime rate has made people more wary about opening their doors to strangers, particularly after dark. Third, the unemployment rate is higher; therefore, fewer people may be commuting to jobs in downtown Los Angeles. Fourth, because we started the survey three weeks later than in 1973, it was darker in the evenings. During the third week of the survey, it was completely dark because California has reverted from Daylight Savings Time back to Standard Time. This last factor had a definite effect, as people are more reticent to open their doors to interviewers after dark.

Because of these difficulties, as well as problems the survey workers had encountered with packs of roving dogs and hostile territorial ethnic gangs, we decided to switch to a telephone survey. Although this procedure would not mitigate all of the problems discussed above, it would eliminate the difficulties associated with conducting a door-to-door survey in the dark.

TELEPHONE SURVEY

## Sample Design

Lists of four-digit random numbers obtained from a computer were used in conjunction with forty telephone prefixes falling within the San Bernardino corridor. (This process assured that unlisted telephone numbers were not omitted.) The four-digit numbers were allocated to each prefix in proportion to the ratio of phone numbers in that prefix to the total number of phone numbers in the corridor.

The phone survey employed a 3,244 sample. This resulted in about 8,750 calls, as each number was called an average of 2.7 times before the call was considered complete. The actual sample size that resulted from the survey is given in Table 3.

Table 3

BREAKDOWN OF PHONE SURVEY SAMPLE

| Numbers called: 3,244 | | n | % |
|---|---|---|---|
| No Contact Made | | | |
| No answer repeatedly; busy repeatedly, not a residence; recording (no way to make contact); refusal | | 1,289 | 39.7 |
| Contact Made | | | |
| Non-commuter households | 1,789 | | |
| Commuter households | | | |
| Valid questionnaires | 151 | | |
| Refused; commuter could not be interviewed | 15 | 1,955 | 60.3 |

Field Procedures

Survey workers called between 6 and 9PM, Sunday through Thursday. If the answer to the question--"Do you or other members of your household regularly work in the Los Angeles downtown area or in the Wilshire District"--was "yes", the interviewer asked to speak to the target person and then conducted the interview by phone. If the commuter was not at home or was too busy, the caller made arrangements to call back at a more convenient time. Calls where there was no answer or the line was busy were recalled up to ten times to assure that the sample was not biased by eliminating hard-to-reach people. Calls were also made during the day and on the weekends if no response could be obtained after several evening attempts.

Questions 26-33, the attitudinal questions, were omitted from the phone survey because the gradations in responses made these questions rather difficult to answer without the interviewee's seeing the questionnaire. The door-to-door survey had produced sufficient data for analysis of attitudes.

THE COMBINED SAMPLE

The valid, completed questionnaires from the door-to-door survey and the telephone survey were then combined and sorted as follows:

| | |
|---|---|
| Door-to-Door Survey: | 342 |
| Telephone Survey: | 151 |
| TOTAL VALID QUESTIONNAIRES: | 493 |

The 493 valid questionnaires were separated into two samples--one for the mode split analysis and one for the marketing analysis. For the mode split analysis, 32 returns were eliminated because of insufficient data, leaving 461 to be analyzed.

For the marketing analysis, a separate sort was made, eliminating 19 interviewees who traveled to points slightly outside the downtown area.* However, these 19 questionnaires were usable for the mode split analysis, even though their comments about why they do or do not use the busway were not relevant to the marketing analysis. Exclusion of these 19 questionnaires brought the marketing analysis sample down to 474.

*That the destinations of these 19 commuters were outside the project area was not caught in the screening process; thus they were interviewed.

# IV. MODE SPLIT ANALYSES

## OVERVIEW

Data from the household survey described in Chapter III were used to analyze the economic basis for people's decisions to use or not use the busway. The time and money required to go by busway and by auto were compared with different commuters' choice of modes, thus producing a mode split function for the particular market studied. This analysis allowed a more objective assessment of people's reasons for using the busway than was possible by asking them their reasons directly, although that was also done.

The mode split function was also compared with the Los Angeles Regional Transportation Study (LARTS) model, an earlier mode split model for the Los Angeles Area. The earlier study was much more elaborate than ours and used more detailed data and sophisticated computational techniques than was possible or appropriate in the present effort. Nevertheless, the data collected in the San Bernardino Corridor survey have allowed us to examine in detail the travel behavior of a special group with respect to marketing transit. Downtown commute trips, the subject of this survey, comprise a particularly transit-oriented market in any city, with a much higher mode split for transit than that for all trips within a metropolitan region.

That the busway offers premium service allowed us to see how commuters who are in a position to use transit react to the availability of truly good service. Ridership data show that commuters do use the busway. The analysis of household survey data shows why they use the busway and why ridership is so much greater than that predicted by planning models now in use.

## CONCLUSIONS

By relating trip data from the survey to transit usage, as described in the following pages, we see the following conclusions emerging:

- Commuters in the busway corridor have chosen their mode of travel entirely in accord with economic theory; i.e., the probabilities of their choosing transit were well correlated with time-cost savings. Thus, people for whom the busway offers good service use it.

- The busway's success is a result of having provided premium service to a particular market for which it is well suited, a market made up of people in a position to take advantage of this service.

- As long as good service--in terms of travel time and convenience--is provided at a reasonable cost, the busway form of rapid transit can attract riders and is not inherently inferior to rail rapid transit.

- Downtown commuters are, indeed, a special market for which greater mode splits can be achieved than are possible with other groups. Several reasons for this difference will be suggested. Simple aggregate models do not adequately predict this difference. More sophisticated models, however, should be able to overcome this problem.

## THE DATA

Both this section and the one following will provide an overview of the data from the household survey, making what observations are possible from a few average statistics. The preparation of the data for the detailed mode split analysis is explained later in this chapter. The household survey yielded 461 questionnaires with sufficient data to be included in the mode split analysis. All those contacted

who indicated that they were regular commuters to downtown Los Angeles were interviewed. Several nighttime commuters, as well as those who failed to provide sufficient data for computation of their travel costs, were excluded from this analysis.

On the basis of various average statistics presented in the course of the analysis (mode split and income of bus users), the sample appears to be reasonably representative. It appears that mid-day off-peak commuters--those leaving for work downtown after 9AM, especially in the case of busway users--were undersampled, probably because they were working during the early evening hours when the survey was conducted. Nine percent of the bus users in the sample leave for work before 6AM; four percent leave after 9AM. Ridership data show that about 30% of busway trips are off-peak or reverse commutes; the off-peak on-board survey, which sampled only the 9AM to 6:30PM westbound riders, found that 49% of these trips were work trips. Although the totals are not too far off (4% + 9% = 13%; 30% X 49% = 15%), the sample does appear to be biased away from mid-day work trips.

After the survey was conducted, the responses were coded and keypunched. The cost, peak-period line-haul and excess times, and mileage (for auto users only) were then computed for each commuter using the mode by which his or her most recent trip was actually made.

Auto drivers were asked whether they themselves paid for all the costs of driving. Many drivers do not pay all their auto costs (e.g., gas, parking, insurance, etc.); thus, the computed auto costs for these drivers were adjusted accordingly. People who regularly ride as passengers with another driver, perhaps paying something for the ride, were considered to be

auto users with time and money costs as indicated by their questionnaire answers. Payments received by drivers in such arrangements were deducted from auto costs. In the case of carpools with alternating drivers, money costs were divided by the number of passengers. In all multiple occupancy arrangements, the pick-up and drop-off times were added to the computed excess time.

For busway users, actual bus fares paid, plus parking and mileage costs--if any--were used. Driving time required to get to the bus was added to bus line-haul time. Excess time included waiting time for initial boarding as well as transfers, and origin and destination walking time.

The results of these calculations are summarized in Table 4, which presents average time and money costs for each type of commuter. Time has been assigned a value of $3/hour for line-haul time, $7.50/hour for excess time. (These are "base" values; other values are tested in the section on Sensitivity Analysis, later in this chapter.) On the average, driving is more expensive than taking the bus, but it requires less time. However, driving is not more expensive for all commuters since both "regular passengers" pay less than any bus riders, and alternate drivers in carpools pay less than those people who park and ride at El Monte. Since our data show that only eight out of thirty-one regular passengers pay anything for their rides, most of them are probably riding with other members of their families. In this case, it is clearly cheaper to ride as a passenger than to pay bus fare and have to get to the bus. For those passengers who do pay for their rides, the average total trip cost is still only $.35.

Table 4

COMMUTING COSTS AND TIMES

| Commute Costs | Auto Commuters: Driving Alone | Auto Commuters: Regular Driver Carrying Regular Passengers | Auto Commuters: Regular Passenger | Auto Commuters: Alternate Driver | Bus Commuters: Walk to Bus | Bus Commuters: Drives to San Gabriel/ Eastland | Bus Commuters: Drives to El Monte |
|---|---|---|---|---|---|---|---|
| Sample Size | 268 | 32 | 31 | 21 | 32 | 46 | 31 |
| Money Costs | cost (# cases) | cost (# cases) | cost (# cases) | cost (# cases) | cost (# cases) | cost (# cases) | cost (# cases) |
| Operating Cost* (per person) | $1.58 (268) | $1.81 (32) | -- | $ .69 (21) | -- | -- | -- |
| Downtown Parking Cost (daily cost per person - 2) | .45 (80) | .20** (11) | $ .03 (31) | .06 (21) | -- | -- | -- |
| Carpool Payments (not including parking) | -- | -- | .35 (8) | -- | -- | -- | -- |
| Carpool Receipts (not including parking) | -- | - .49 (10) | -- | -- | -- | -- | -- |
| Auto Feeder Cost (per vehicle) | -- | -- | -- | -- | -- | $ .16 (46) | $ .50 (31) |
| Parking Cost at Bus Park-and-Ride Lot (per vehicle) | -- | -- | -- | -- | -- | .17 (4) | .07 (10) |
| Bus Fare | -- | -- | -- | -- | $0.52 (31) | .51 (44) | .51 (30) |
| AVERAGE TOTAL COST (per person-trip) | 1.71† | 1.73 | 0.12 | .75 | .50 | .66 | 1.02 |
| Time Costs | | | | | | | |
| Driving/Riding on Bus Time*** (@ $3.00/hr) | 1.59 | 1.55 | 1.64 | 1.53 | 1.91 | 1.90 | 1.97 |
| Excess Time**** (@ $7.50/hr) | .24 | .45 | .88 | .71 | 2.14 | 1.26 | 1.27 |
| TOTAL | 1.83 | 2.00 | 2.52 | 2.24 | 4.05 | 3.16 | 3.24 |
| GRAND TOTAL | 3.54 | 3.73 | 2.64 | 2.99 | 4.55 | 3.82 | 4.26 |

* 12.25¢ per mile. See note on p. 45. Average distance = 15.1 miles.

** For driver only.

*** Driving time for auto users; bus riding time plus driving to bus time (if any) for bus users. (Average bus trip = 15.2 miles.)

**** For autos includes parking lot to workplace time and passenger pick-up time; for bus riders, walking time at both ends plus waiting time.

† 1.71 = [(1.58 x 268) + (.45 x 80)] ÷ 268.

Combining time and money costs, we found that driving has only a slight advantage over using the bus. The average bus commute uses about 20% more time and money than the average auto commute. Since actual costs to each commuter should be distributed as a random variable around the average costs, there will be many commuters for whom the bus is economically preferable to driving.

## AVERAGE MODE SPLITS

Given the competitive economics of the service provided by the busway, it is not surprising that 24% of the commuters surveyed use the bus to get to work. This figure is only slightly lower than expected from the ridership counts for the period of the survey: there were roughly 5,700 two-way daily riders making work trips*, or 26% of the 22,000 daily home-based downtown work trips from the San Bernardino Freeway Corridor (as estimated from Census data). The discrepancy could be due to the total downtown work trips from the corridor having been understated.

Although the mode split achieved may not be surprising at first glance, in view of the premium service being offered, it does appear to contradict existing planning models being used in the Los Angeles Area. The LARTS Disutility Model would predict about half the actual mode split observed. It is felt that the difference is due to the special characteristics of the downtown commute, which are not adequately captured by the particular style of aggregate analysis used in the LARTS model. This point will be discussed in greater detail later in this chapter.

*Ninety-five percent of 5,000 peak period two-way trips are work trips; 49% of 2,000 off-peak and reverse direction two-way trips are work trips.

Support for the notion that radially concentrated commute trips are more susceptible to transit use than more dispersed work trips can be found in the average statistics. If concentrated trip destinations do encourage transit use, then mode splits for commuters to the most central, densest part of the downtown area ought to be higher than mode splits for commuters to more outlying parts of the downtown area. Table 5 confirms this hypothesis.*

Table 5

AVERAGE MODE SPLITS BY DESTINATION AREA

| Destination | Sample | Percent Bus for Area | Cumulative*** Percent Bus |
|---|---|---|---|
| Core CBD** | 217 | 30.9 | 30.9 |
| Outlying CBD | 88 | 23.9 | 28.9 |
| Downtown, except CBD | 138 | 14.5 | 24.4 |
| Near Downtown | 18 | 5.6 | 23.6 |

Moreover, the analysis done for the First Year Report showed that, even holding the relative advantage of auto over transit constant, CBD commuters are much more likely than non-CBD commuters to use the bus for any given level of disutility.

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* The table also provides a further check of the survey results. 1970 Census data, compiled by Caltrans, District 07, show 15,600 CBD work trips from the Corridor. In the household survey, 81% of the bus users commute to the CBD; applied to our estimated 5,700 daily work trips, that is 4,600, or 29% of 15,600 using the bus to commute to the CBD (compared to the 28.9% in Table 5).

** Core CBD = CBD east of Figueroa. Outlying CBD is the Wilshire Boulevard corridor.

***E.g., 28.9 is the mode split for the outlying CBD and the core CBD together.

Reliance on the LARTS model might also cause some surprise at the income characteristics of busway users since that model shows that high income people have a greater resistance to transit than do people with lower incomes. Yet the Fall 1974 On-Board Survey showed that busway users have an average household income of $17,500, which is much higher than the average income for the corridor as a whole. According to 1967 Caltrans data, factored to 1975 values, the average median zonal household annual income for the corridor is $13,700 ($14,800 east of Garfield Avenue). After the opening of the El Monte Station, busway users had an average household income of $18,300. The explanation for this apparent discrepancy, again, lies in the special nature of downtown commuters. Table 6 shows the distribution of incomes among downtown commuters in the corridor, according to the household survey, along with their transit mode splits.

Table 6
INCOME AND TRANSIT USE

| Income Group | n | % of Sample | % Using Transit |
|---|---|---|---|
| Less than $10,000 | 31 | 7.9 | 25.8 |
| $10,000-$14,999 | 108 | 27.5 | 28.7 |
| $15,000-$29,999 | 210 | 53.4 | 18.1 |
| $30,000 and over | 44 | 11.2 | 18.2 |

Higher income people do, indeed, use transit less per household; but downtown commuters as a group also have much higher incomes than does the population as a whole. Using midpoints to compute an average of the incomes shown in the table above, we find that all downtown commuters had an average annual household income of $20,000; bus users surveyed had a lower average income, $18,600, which agrees well with the results of the On-Board Survey. In

other words, busway users have higher incomes because high income households are in a position to take advantage of the busway, not because such people have any intrinsic liking for the busway.

## THE LARTS MODEL AND THE DISUTILITY CONCEPT

The travel forecasting model currently being used in the Los Angeles Area is the LARTS Transportation Model. The model was last updated using the results of a 1967 origin-destination survey. These data were also used to develop a mode choice model, described in detail in the Los Angeles Metropolitan Area Mode Choice Model Development Study, prepared by Alan M. Voorhees and Associates and published by SCAG and SCRTD in February 1972. The household survey data collected by Crain & Associates for this busway evaluation have been used, in part, to perform a comparison with the LARTS mode choice model.

The LARTS mode choice model consists of two major, conceptually distinct pieces. The first of these, the transit disutility measure, is a formula for computing how much better or worse transit is than auto for a particular trip and trip maker. The second major part of the model is a set of mode split curves. For a group of people of given median income making a trip with known transit disutility, these curves predict what percentage of those trips will be made by transit.

The LARTS disutility measure may be defined as follows:

$$U = (Tr - Ar) + 2.5\,(Tx - Ax) + \frac{1}{0.25I}\,(Tc - Ao)$$

where: U = disutility of transit (in minutes)
Tr = transit running time
Ar = auto running time
Tx = transit excess time (access and waiting)
Ax = auto excess time (access and terminal)
Tc = transit fare cost
Ao = auto operating cost (including parking fees)
I = zonal median household income

All times are in minutes and costs are in cents. "I" is given in cents/minute or (annual dollar income)/(2080 hours X 60 minutes/hour X 100). Notice that a positive transit disutility means that transit is worse than auto.

Each of the three terms represents one aspect of the disadvantage of transit compared to auto. All are converted into "equivalent minutes" of disutility. The term "0.25I" gives a value of time based on earnings; here it is used rather as a "time value of money", having been inverted to convert "money disutility" into "time disutility".* The coefficient of 2.5 on the excess time term is a "psychological multiplier" representing the common assumption that waiting and walking time is somehow more objectionable than riding time. Thus, each minute of excess time is converted to 2.5 equivalent minutes of total time. Auto operating cost is computed as $.0476 per mile. Although less than the true total cost of driving or even the true variable cost of driving, this figure is used to represent the perceived marginal cost of driving, i.e., the extra out-of-pocket cost of driving one additional mile.

All of the coefficients and constants in this disutility measure are based on judgment and established practice. None

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* This is a somewhat unusual procedure, but it does have the advantage of allowing everything to be considered in the "natural" units of time, whose true value is relatively constant over the years, being subject only to changing economic productivity and not to inflation. To see this, assume a very simple model in which inflation causes all prices, including that of labor (and hence incomes) to rise evenly. Then any growth in the cost difference term will be exactly offset by growth in value of time (as a percent of income): therefore, the equivalent minutes will be unchanged. Gains in real productivity, on the other hand, increase the amount of wealth in the world and cause gains in income compared to prices; equivalent minutes to the cost difference term will drop.

were estimated, or "calibrated", from the origin-destination data. This is emphasized not to imply that they may be wrong, but to underline the distinction between the chosen disutility measure and the calibrated mode split curves discussed below. The manner in which the values used were chosen, and the possibility that other values might be more approriate, are discussed later in this chapter.

The mode split curves, the other part of the LARTS mode choice model, are shown as part of Figure 4. They are based on the theoretical proposition that people will tend to choose the mode that is economically advantageous to them, and that the chosen disutility measure is a good indicator of economic advantage (or disadvantage). Negative disutility values imply that transit is "better" than auto; therefore, more people will tend to use transit when this is the case. It is further assumed that people of different income groups, in addition to valuing their time differently, will exhibit different behavior due to car ownership levels and other socio-economic factors correlated with income. These "hand-plotted" curves were calibrated by an iterative trial-and-error process in which the ten points shown in Figure 4 were adjusted up and down until a run of the entire LARTS model using the base year network produced travel patterns close to the known base year travel patterns.

## PREPARING THE SURVEY DATA FOR COMPARISON

In order to compare the results of the household survey with the LARTS mode choice model, it was necessary to convert the cost calculations described earlier to the LARTS disutility measure. Initially, this was done using values of the

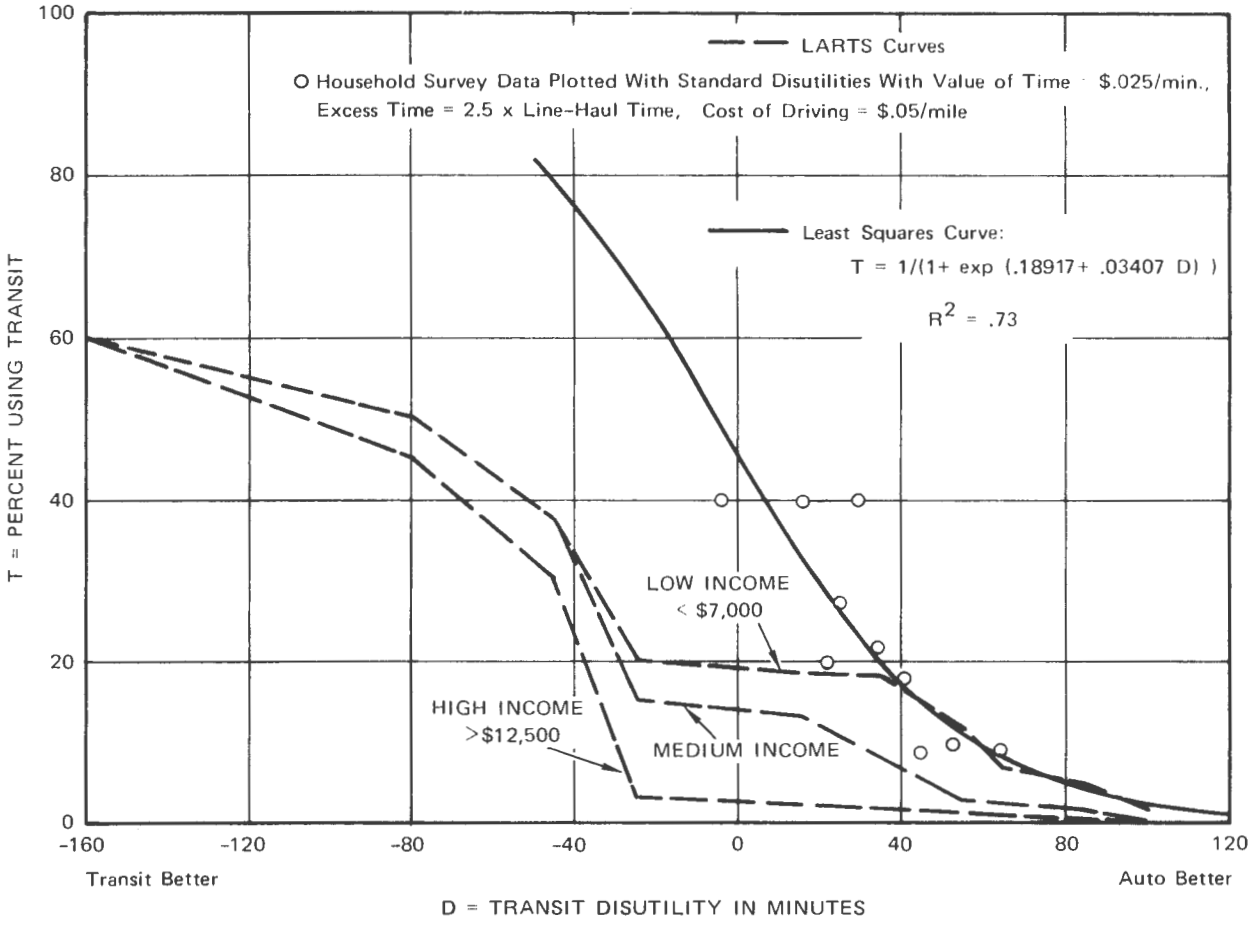


FIGURE 4 MODE SPLIT COMPARISON: LARTS CURVES AND HOUSEHOLD SURVEY DATA PLOTTED WITH STANDARD DISUTILITIES

coefficients in the disutility function close to those already given in the LARTS formula. The survey gives only time and cost for the mode actually used by each commuter. In order to compute each commuter's transit disutility, we estimated a set of "standard costs", two for each pair of origin and destination zones, one for auto and one for bus. Auto users were assumed to drive alone, paying all costs, including the average parking cost of $.15, with a terminal excess time of 2.1 minutes; bus users were assumed to park and ride, pay the standard fare, and have 5 minutes terminal excess time. In the discussion which follows, "actual disutility" means,

a. For bus users: (actual bus times and costs) - (standard auto times and costs)

b. For auto users: (standard bus times and costs) - (actual times and costs).

"Standard disutility" means, for all commuters: (standard bus times and costs) - (standard auto times and costs).

The purpose of using standard disutilities is to produce data more like that which would normally be available for predicting mode split according to a mode choice model similar to the LARTS model. Also, such data are more like the aggregate total data used to calibrate the LARTS modal split curves than are the actual disutilities.

In order to plot mode split against disutility, we grouped the data into ten subsamples of approximately equal size. One subsample included the 10% of the commuters with lowest disutilities; another subsample included the 10% with the next lowest disutilities, and so on. Thus, all points plotted represent statistics of comparable confidence. Each point shows the average disutility and the percent of bus riders for one subsample. Of course, the points of highest and lowest disutility represent wider disutility ranges than the other points.

## THE COMPARISON

Figure 4 shows the LARTS modal split curves along with the household survey data, plotted with standard disutilities and the LARTS disutility coefficients. The household survey points have been curve-fitted by unconstrained ordinary least squares, using a simple binary logit model of the type common in mode choice studies. For any given disutility, the survey points show a much higher mode split than that predicted by the LARTS curves, especially considering the average income of the survey group (nearly $20,000 annually). The discrepancy grows towards the "transit better" end of the scale.

Although the survey points do not match the LARTS curves, they do form a consistent pattern, falling reasonably close to a curve whose shape is suggested by theoretical considerations. Thus, it cannot be said that these commuters behave in any economically irrational fashion. Those for whom transit service is relatively good tend to use it; those for whom it is not so good tend not to use it. It also does not need to be argued that these commuters, for some inexplicable reason, are simply "pro-transit" in their attitudes.

It is not necessary to reach beyond accepted theories of economic behavior to find an explanation for the apparent discrepancy. It is suggested, rather, that there are elements of relative transit utility, particularly relevant to downtown commuters, but not captured in the LARTS disutility measure. Several such elements will be discussed.

### Auto Excess Time

Just as time spent not moving on the bus is counted as more psychologically irritating than running time (by a factor of 2.5), it may be reasonable to count "extra" auto time,

due to stop-and-go conditions on the freeway, as more irritating than ordinary driving time, i.e., to count it as auto excess time. Evidence on this point, derived from attitudinal questions asked on this and previous surveys, is reported in Chapter III. The annoying and unpredictable character of such delays may figure in the driver's mind as much as the actual time involved. Such delays share this annoying, unpredictable nature with the delay of waiting for a bus to arrive.* Downtown commuters will encounter more of this congestion-related excess time than the great bulk of auto commuters, most of whom travel to more dispersed job locations. Thus, the LARTS disutility measure may be overstated for downtown commuters, indicating that auto travel is more attractive to these commuters than it actually is. This has the effect of moving points plotted for downtown commuters to the left of the main curves.

Working Hours

Because downtown workers--and particularly CBD workers--are most likely to have white-collar, office jobs, they have very regular working hours; that is, their commute times are more concentrated toward the peak-hours than is the case with workers in manufacturing and service jobs located in a more dispersed pattern throughout the region. This affects the accuracy or completeness of the LARTS model in several ways. The first problem arises because the LARTS curves were calibrated for all work trips but used peak-hour transit and highway characteristics. For the average work trip, this causes transit times to be underestimated, and auto times and costs to

* Questions 32 and 33 attempted to get commuters to make a quantitative comparison between freeway congestion time and bus waiting time. Unfortunately, most respondents seemed to have found the questions confusing to the extent that no meaningful results can be reported.

be overestimated. As a result, net transit disutility comes out too low; that is, the LARTS curves are to the left of where they ought to be. Seen differently, at a given assumed disutility level, the LARTS curve includes many commuters with true disutilities that are much higher and who, therefore, use transit less than commuters who have the disutility shown, thereby bringing the curve down from where it would have been had off-peak trips been calibrated separately. The household survey points were also calculated using peak-period transit and highway characteristics for all downtown commuters, but because only downtown work trips were plotted, given their concentration in the peak hours, they came out higher than the curves calibrated using all work trips.

A second reason why the regular working hours of downtown commuters make them more likely to use transit, even controlling for differences in disutility, may be the relative safety and reliability of riding in the daytime, at the same time every day. Non-downtown workers are more likely to make at least one leg of their daily commute after dark; thus, they are more exposed to crimes while traveling, while waiting for the bus in out-of-the-way locations, and while walking to or from their homes in the dark. Non-downtown workers are also more likely to work different hours or in different places on successive days. This will make the advance planning involved in using transit more onerous for them and will often rule out the likelihood of completely dispensing with a car.

Side Trips

In a more speculative vein, we may note that downtown workers are not likely to need their cars to make side trips

for shopping or other errands, either at commute time or on their lunch hour, since they will often be able to find the service or goods they need within walking distance of work. This needs to be balanced against the possibility that some downtown workers' jobs may often require them to drive to diverse locations during the day for meetings, on-site inspections, and the like. For example, such would be the case for certain government workers. In the case of busway users, since most park and ride, they have their cars available for side trips near home without having to drive all the way to work.

A final additional explanation may be found in the 1973 Los Angeles Metropolitan Area Mode Choice Model Development Study:

> The RTD estimates that the LARTS survey underestimated total regional transit ridership. . . . This problem can be attributed to both the estimate error due to the small (1 percent) sample O-D survey and to the underreporting of trips by some groups. Since the mode split model was calibrated to the O-D study table, it may therefore underestimate transit travel. (p. 76)

To summarize, the LARTS disutility measure and the mode split curve calibration procedure both failed to distinguish important differences between downtown commuting and other work trips. These differences include regular working hours for downtown commuters, more auto excess time, and less need for a car to run errands. The problem of not including auto excess time could be solved by redefining the LARTS disutility measure. The other matters could be resolved, given the style of aggregate calibration used by LARTS, only by estimating

separate curves for downtown and non-downtown work trips and for peak and off-peak trips. An example of stratifying for destination is the Bay Area Transportation Study mode split model, developed in 1969.* Separate mode split curves were estimated for CBD-bound trips and non-CBD-bound trips, both for work and non-work purposes with three different levels of residential density (substituting for income). The CBD curves do indeed show much higher transit mode splits than the non-CBD curves at any given transit/auto travel time ratio. Moreover, the CBD/non-CBD effect is much more significant than the residential density (or income) effect, as the CBD curve for the lowest density (presumably highest income) group is much higher on the graph than the non-CBD curves for all but the highest residential densities.

## SENSITIVITY ANALYSIS

Since the precise definition of the LARTS disutility measure is so open to question, both regarding the components of time and cost used and the coefficients applied to them, a sensitivity analysis was performed to test the effect of altering parts of the formula. This sensitivity analysis was performed very much in the spirit of the procedure described in the 1972 Development Study Report, which was used to decide on a weighting factor for excess time and to choose between stratifying by income or by car ownership level. There, the individual trip records were grouped into subsamples to create plottable points, giving average disutility level and percent using bus. The subsamples were grouped by constant

* Hanna Kollo, Mode Split Model Development, Bay Area Rapid Transit Study Commission, Berkeley, California, November 1969 (BATSC Technical Report 227).

intervals of disutility, rather than into groups of equal size (by percentiles of disutility, in effect), as is done here. This was done here using various forms of the disutility measure. Whenever the method of computing disutility was changed, the data were regrouped into new subsamples according to the new disutility ordering. Each time, the points were plotted and the resulting line joining the points was judged by its smoothness.

Several values of time and several values of the "psychological multiplier", applied to excess time, were considered. All combinations of psychological multipliers of 1.5, 2.5, and 3.5, and of values of time of 2.5, 3.5, 5.0, and 6.5 cents/minute were tested. Although the LARTS model development process tested several psychological multipliers, different values of time were not tested.

Changing the value of time, actually used as a time value of money in the LARTS disutility measure, changes the computed disutility for each trip and also changes the disutilities of the trips relative to one another, since each trip's disutility has various proportions of time and money cost differences. Depending on whether the money cost differences (transit cost - auto cost) is positive or negative, the computed disutility will get larger or smaller as the value of time gets smaller. Of course, the mode chosen for each trip is fixed. Since transit is generally cheaper than auto, larger values of time will generally cause the curve to move to the right. Presumably, the "correct" value of time will also cause the plotted points to line up into a smoother, more reasonable looking curve than will "incorrect" values of time. The low value of time (2.5 cents/minute) represents the LARTS value of 0.25 times the

average earnings rate, using $12,500 as the average annual income. The high value of time (6.5 cents/minute) represents a formula from value of time studies by the Stanford Research Institute of 0.43 times the average earnings rate, using an average annual income closer to the $20,000 figure found in our survey to be representative of downtown commuters in the corridor. The remaining values of time tested were chosen to fill in the range between the high and low values.

Changing the value of the psychological multiplier also causes the computed trip disutilities to resort themselves along the disutility scale. In general, since transit excess time is almost always longer than auto excess time (as defined in the disutility measure), increasing the value of the psychological multiplier will tend to move the curve to the right. The three values tested were chosen to bracket the customary value of 2.5, which was used in the LARTS model.

In the sensitivity analysis, disutilities were computed using 12.25 cents/mile as the cost of driving. This was meant to represent the true marginal cost of driving* rather than the "perceived marginal cost" (in 1967) of 4.76 cents/mile used in the LARTS model. The higher figure was based on the assumption that for repeated, seldom varying trips, such as the home-based work trips being modeled, people are more likely to base their decisions on the correct, total variable cost of driving than they would for occasional, more varying trips. In any event, both cost/mile figures were used for a few cases, and it was

* This figure is based on U.S. Department of Transportation statistics for April 1974, inflated to October 1975. Costs for suburban operation of a standard sized car were used, including maintenance, gas and oil, taxes and half of depreciation; insurance, parking and tolls were excluded.

determined that this parameter had little effect on the shape of the curve produced although, of course, the position of the curve was affected.

Ten points representing subsamples produced by the method described earlier were plotted for all combinations of value of time and psychological multiplier, with both "actual" and "standard" disutilities (as defined earlier). The curves, i.e., lines joining the plotted points, were judged on the basis of the actual disutilities, since they represent the most accurate picture of the factors influencing people; the standard disutilities were plotted for purposes of comparison.

All these cases were then repeated leaving out of the sample all people who claimed to need their cars during the day. Twenty-seven percent of all people surveyed--over a third of all auto users--made this claim. (A similar question tested for transit captives, but found virtually none.*) If this answer is interpreted to mean that the respondent is in some sense an "auto captive" without a true choice of mode, then leaving these "auto captives" out of the sample ought to produce a smoother plot, which would give a better fit to a theoretical curve. This would be the case unless the auto captives had a uniform distribution of computed disutilities. In fact, the plots with and without auto captives consistently had the same shape, for all combinations of value of time and psychological multiplier, using actual and standard disutilities (except, of course, that the plots without auto captives were slightly higher). In some cases, the plot without captives was

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* Less than one percent of the total sample had no car available for use in their household. None of these were usable for the mode split analysis.

somewhat rougher than the plot with all respondents. Therefore, the meaning of people's claims that they need their cars during the day is open to question.

Of all the curves plotted, by far the best results were for a value of time of 5.0 cents/minute and a psychological multiplier of 2.5. These points and a theoretical curve fitted by ordinary least squares are shown in Figure 5. This may be interpreted as a confirmation of the LARTS values. The psychological multiplier is the same one used in the LARTS measure, and 5.0 cents/minute is close to 0.25 of the average earnings rate of downtown commuters surveyed. Figure 6 shows the results of plotting standard disutilities with the same values. The much sloppier results appear to indicate that much of the explanatory power of the disutility data is lost in the averaging process used to compute the standard disutilities. A similar averaging process occurs when zonal trip data are used to calibrate a model. These results demonstrate a simple case of the conclusion reached by researchers in travel demand modeling, that disaggregate trip data can be used far more efficiently than aggregate data to estimate travel demand models.

## WRAP-UP

The startlingly good fit obtained from the household survey data by the sensitivity analysis strengthens the conclusion reached earlier that the behavior of commuters towards the busway is completely in accord with economic travel demand theory. The analysis is not meant as a new mode split model but as a demonstration that busway patronage is a result of the good level of service (in comparison with driving) available to

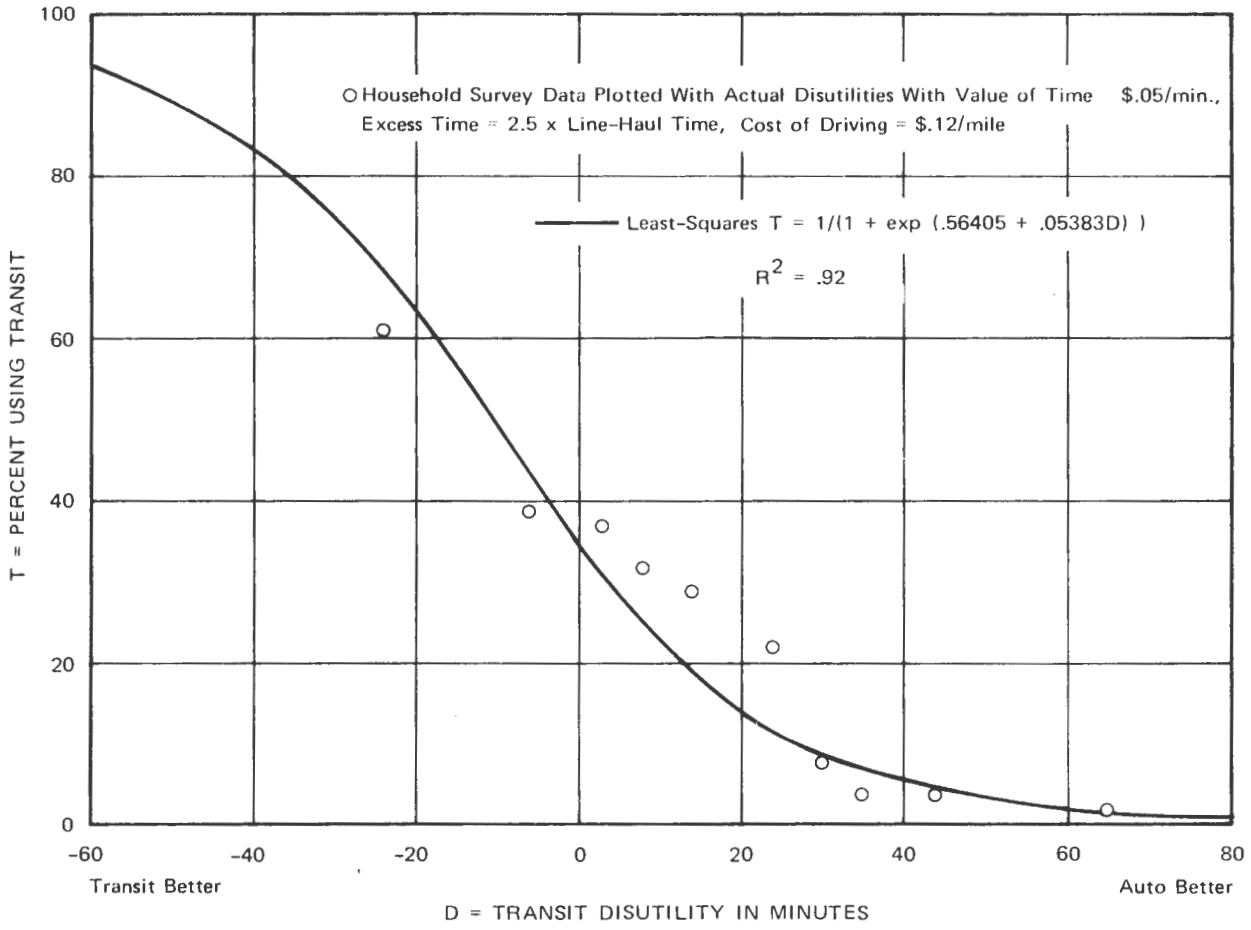



FIGURE 5 HOUSEHOLD SURVEY DATA PLOTTED WITH ACTUAL DISUTILITIES AND BEST COEFFICIENTS

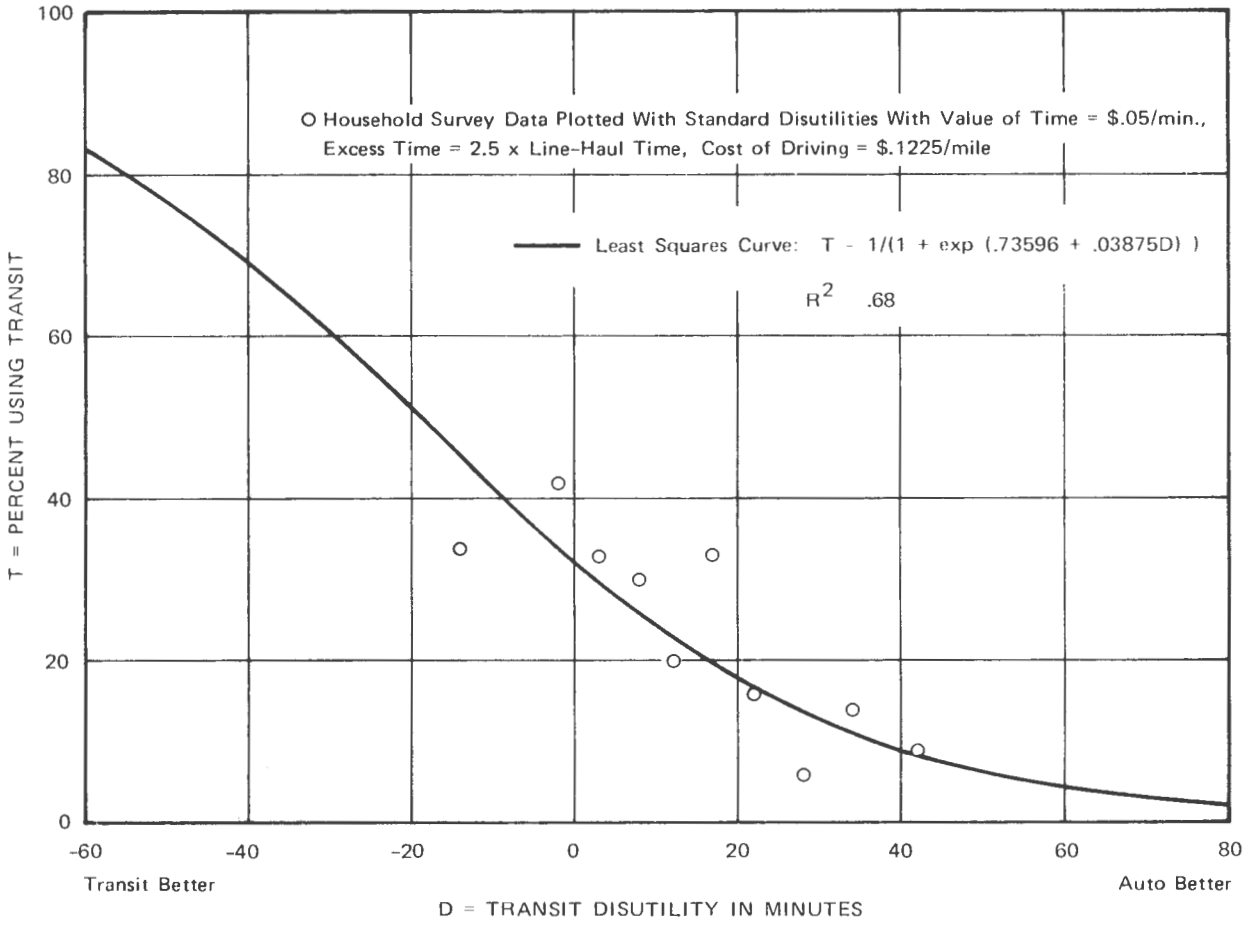



FIGURE 6 HOUSEHOLD SURVEY DATA PLOTTED WITH STANDARD DISUTILITIES AND BEST COEFFICIENTS

potential riders. This level of service is a function of the design and operation of the busway and the special characteristics of the market at which the service is aimed, namely, downtown commuters. The results give no reason to suppose that the busway attracts more or less riders than would rail service simply because of the form of the service, given that the travel times and costs of the two services were similar. The analysis shows that the downtown commute is a special trip that can be served better by transit than is the case with other kinds of trips. By directing premium service at this special group, even in Los Angeles, the archetypal auto-dominated city, significant diversion of former auto trips can be achieved.

The analysis also contains a warning. The success of the busway does not imply that people in Los Angeles are more receptive to transit than was previously thought, but that a particular high-income group with a special travel pattern will, as in other cities, use good service if it is available. The vast majority of trips by the vast majority of people in Los Angeles does not fit this description.

## V. MARKETING ANALYSES

The marketing analyses focused primarily on commuters who use their cars instead of the busway and, to a lesser degree, on the general public. Some discussion of busway users is also included and is related to attitude measurements and to socio-economic profiles in earlier surveys. (A complete analysis of busway users is contained in the Second Year Report.) However, in the present analyses, we focused on identifying who the non-users are and why they are not using the busway facility.

### GENERAL PUBLIC REACTION

We asked all of the people contacted during the household survey if they were aware of the existence of the busway and--regardless of whether or not they used the busway--if they approved of having exclusive lanes for bus use. The same awareness question was asked during the Fall 1973 household survey, the results of which are included here for comparison.

| | % Aware | | % Approving the Idea | |
|---|---|---|---|---|
| | 1973 | 1975 | 1973 | 1975 |
| Non-commuter households: | 93 | 75 | N/A | 88 |
| Commuter households: | 95 | 88 | N/A | 89 |

Since the inception of the project, broad public support for separate, exclusive busway lanes has been strong. The high level of awareness, again, supports the contention that the busway is self-advertising because of its visibility to the auto user.

## AUTO TRIP CHARACTERISTICS

Three-fourths of the auto commuters surveyed begin their downtown trip between 6 and 8AM. Almost half leave between 6:30 and 7:30. Their distribution to the downtown zones is shown in Figure 7. Almost two-thirds of these commuters travel to the Central Business District (CBD), which is comprised of Zones 4, 7, and 10. Once they park their cars, 95% walk two blocks or less to their work locations.

### Submode Split

The split of auto drivers by submode is as follows:

| | n | % |
|---|---|---|
| Drive alone | 275 | 76.2 |
| Regular driver carrying regular passengers | 34 | 9.4 |
| Regular passenger | 31 | 8.6 |
| Alternate driver | 21 | 5.8 |

Aggregated, these figures indicate that 76% of the person-trips to downtown Los Angeles are in single occupant cars; 24% are in carpools.* These two groups of auto users are demographically compared, as follows:

| | Drive Alone | Carpool |
|---|---|---|
| Males: | 71.2% | 54.7% |
| Age | | |
| 16-29 years: | 27.7% | 41.9% |
| 30-39 years: | 28.4% | 25.6% |
| 40 years and over: | 43.9% | 32.6% |
| Average household income: | $20,900 | $20,800 |
| Average number of cars per household: | 2.1% | 2.0% |

*This number of auto passengers seems to be slightly understated in this sample since the above data imply an occupancy rate of slightly less than 1.2, as opposed to approximately 1.3 observed on the freeway.

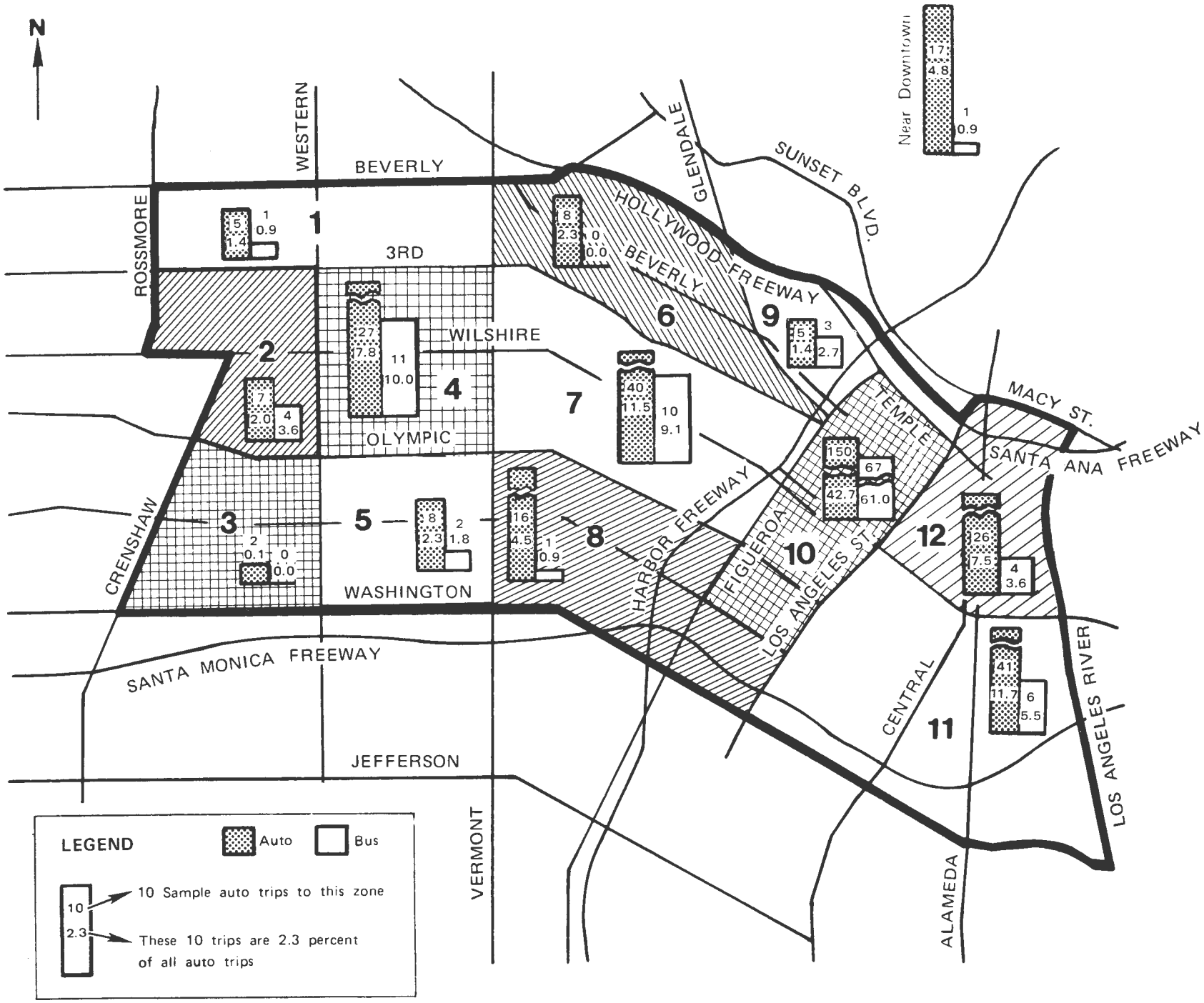



FIGURE 7 DISTRIBUTION OF DOWNTOWN TRIP ENDS

The preceding data show that carpoolers have a higher percentage of females and are younger than people who drive alone, but these two groups show little difference in terms of income level and car ownership.

Carpool ridership breaks down as follows:

| | n | % |
|---|---|---|
| 2 passengers per car: | 51 | 63 |
| 3 passengers per car: | 22 | 27 |
| 4 passengers per car: | 7 | 9 |
| More than 4 passengers: | 1 | 1 |
| No response: | 5 | -- |

These data are based on the survey question asking how many adults (over 16 years) were in the car when the interviewee made his or her last trip downtown.

Reasons Given for Using Car Rather than Busway

Auto commuters were asked if they could have used the busway for their trip to downtown Los Angeles. Sixty percent (208 persons) of all those responding to this question said that they could have, but only 34% said they had ever done so. Table 7 on the following page lists the reasons they gave for using their cars rather than the busway. In addition, the table compares those who drive alone to those who ride in carpools.

As the table shows, the most prevalent reason (30.4%) reported is that the car is needed for use during the day. This large "auto captive" fraction, which was measured at 17% on an early Shirley Highway Busway survey, was also present in earlier surveys of the SBFEB project.

Table 7

REASONS FOR USING CAR RATHER THAN BUS

| | SINGLE OCCUPANT CARS (275) | | CARPOOLERS (86) | | |
|---|---|---|---|---|---|
| | n | % of people responding | n | % of people responding | % of all persons responding |
| Must have car for use during day | 107 | 38.9 | 17 | 19.8 | 34.3 |
| Too far to bus stop | 48 | 17.5 | 11 | 12.8 | 16.3 |
| Bus would take too long | 65 | 23.6 | 16 | 18.6 | 22.4 |
| Don't know where to get bus | 13 | 4.7 | 9 | 10.5 | 6.1 |
| Dislike buses | 35 | 12.7 | 9 | 10.5 | 12.2 |
| Car is less expensive | 18 | 6.5 | 7 | 8.1 | 6.9 |
| I prefer being in a carpool | N/A | N/A | 27 | 31.4 | 7.5 |
| Convenience | 19 | 6.9 | 7 | 8.1 | 7.2 |
| | 305* | | 103* | | |

* Multiple answers were allowed.

Table 8, below, indicates, for each reason given for not using the busway, the particular group most frequently reporting that reason. For each of the three criteria used, the busway users are split into categories, according to that criterion. The percentage of users in each category is compared to the percentage of users in that category who indicated that a particular reason was important for them. The demographic group which shows the greatest difference between the second percentage and the first percentage is concluded to be that segment which is most apt not to take the bus for the reason in question. If no groups show a difference of at least 7%, it can be concluded that this reason for not using the busway cuts across all segments, i.e., across both sexes, all age groups, and all income brackets.

Table 8

REASONS FOR NOT USING BUSWAY BY DEMOGRAPHICS

| | Sex | Age | Income ($000's) |
|---|---|---|---|
| Must have car | M | --- | >30 |
| Too far to bus stop | --- | >40 | 10-15 |
| Bus takes too long | F | 16-29 | 10-15 |
| Don't know where to get bus | F | 16-29 | 10-15 |
| Dislike buses | F | 30-39 | 15-30 |
| Car less expensive | --- | >40 | 15-30 |
| Prefer carpool | --- | 16-29 | 10-15 |
| Convenience | --- | 16-29 | >30 |

The above data, which offer no surprises or major insights into the marketing of busway services, are included here for the reader's consideration.

## RIDER PROFILES

The busway has now been through a three-year evaluation process. During this time, six different surveys were conducted to learn more about the residents of the San Bernardino Freeway Corridor who regularly commute, by bus or by auto, to downtown Los Angeles. It is now possible to make a socio-economic comparison of these two groups to determine if their characteristics have changed over time and to what extent busway commuters differ from auto commuters. See Table 9.

The six different subgroups of commuters can be broken down as follows:

| Group | Survey: Type and Date |
|---|---|
| Pre-Busway Transit Users | On-board survey of 3,300 persons, April 1972. |
| Automobile Commuters | Random household survey of 272 regular auto users, September 1973. |
| Peak-Period Busway Commuters | On-board survey of 1,933 peak-period, peak-direction busway riders, November 1974. |
| Off-Peak Busway Riders | On-board survey of 2,290 persons using the busway for other than peak-period, peak-direction trips, May 1975. |
| Automobile Commuters | Random household survey of 361 regular auto users, October 1975. |
| Bus Commuters | 113 users of the busway and other bus lines, who were interviewed during the October 1975 household survey. (87 were busway users.) |

Table 9

COMMUTER PROFILES (%)

| Attribute | 4/72 Pre-Busway Bus Users | 9/73 Auto Commuters | 11/74 Busway Commuters | 5/75 Off-Peak Busway Users | 10/75 Auto Commuters | 10/75 Busway & Other Bus Commuters |
|---|---|---|---|---|---|---|
| Sex | | | | | | |
| Male | 36 | 49 | 46 | 55 | 67 | 44.5 |
| Female | 64 | 51 | 54 | 45 | 33 | 55.5 |
| Age | | | | | | |
| 16-39 years | 46 | 60 | 60 | 66 | 59 | 52 |
| 40 years & over | 54 | 40 | 40 | 34 | 41 | 48 |
| Annual Household Income | | | | | | |
| $0 to $9,999 | 53.5 | 21 | 24 | 47 | 7 | 10 |
| $10,000 & over | 46.5 | 79 | 76 | 53 | 93 | 90 |
| Auto Availability | | | | | | |
| Cars/household | | | | | | |
| 1.0 or less | N/A | 25 | 37 | 54 | 25 | 39 |
| 2.0 or more | N/A | 75 | 63 | 46 | 75 | 61 |
| Cars/Driver | | | | | | |
| 1.0 or less | N/A | 23 | N/A | N/A | 16 | 18 |
| More than 1.0 | N/A | 77 | N/A | N/A | 84 | 82 |
| Sample Size | 3,300 | 272 | 1,933 | 2,290 | 361 | 113 |

ATTITUDE MEASUREMENTS

Certain attitude measures were repeatedly included in the busway surveys. The intent of these questions was to gauge basic attitudes which affect a person's decision to use or not use public transit.

Passengers were asked to indicate their degree of agreement or disagreement with six attitude statements, using a scale of 1 to 5 (1 meaning strong agreement, 3 meaning no opinion, 5 meaning strong disagreement). The statements were worded so that for some (items 2, 3, 4, 5), strong agreement with the statement denoted a pro-transit attitude; for others (items 1, 6), strong agreeement with the statement denoted a pro-auto attitude.

The mean scores for each of the attitude statements for all commuters (auto and bus) are given below. A low mean score (not adjusted) indicates strong agreement with the statement.

| Statement | Mean Score | Mean Score Adjusted* |
|---|---|---|
| 1. I enjoy driving on freeways. | 2.9 | 2.1 |
| 2. The morning traffic makes driving to work irritating. | 2.5 | 2.5 |
| 3. I feel tense when I can't go faster than 30 MPH on the freeway. | 2.8 | 2.8 |
| 4. If public transportation were more convenient, I would prefer to take the bus to work. | 2.2 | 2.2 |
| 5. If I had to drive downtown to work in stop-and-go traffic (less than 10 MPH), I'd rather take the bus. | 2.1 | 2.1 |
| 6. If I could drive downtown at 60 MPH, I would not consider taking a bus downtown to work. | 2.7 | 2.3 |

* In this column the scale values for items 1 and 6 have been reversed so that a low mean score now reflects a pro-transit attitude. These two statements can now be compared with statements 2-5 where a low mean score reflects a pro-transit attitude.

The data show that there is strong agreement with Statement 5, which deals with avoiding driving in stop-and-go traffic. This finding strongly supports the contention in Chapter IV that "auto excess time" is a major factor contributing to the commuter's decision to switch from congested, peak-period auto travel to busway usage.

Auto vs. Transit Users

Table 10 shows the percentage of responses by auto and transit users to the six attitude statements. The "agree" and "disagree" responses have been aggregated. (Because the "no opinion" category has been eliminated, the percentages do not total 100.)

Table 10

ATTITUDE MEASUREMENTS BY AUTO AND TRANSIT USERS

| Statement | % Agreeing | | % Disagreeing | |
|---|---|---|---|---|
| | Auto | Bus | Auto | Bus |
| 1. Enjoy freeway driving | 51 | 46 | 36 | 43 |
| 2. Morning traffic irritating | 57 | 75 | 36 | 17 |
| 3. Feel tense driving under 30 MPH | 41 | 63 | 46 | 25 |
| 4. Prefer convenient public transportation | 63 | 88 | 30 | 6 |
| 5. Prefer bus to driving in stop-and-go traffic | 66 | 94 | 22 | 3 |
| 6. If able to drive 60 MPH, would not take bus | 59 | 23 | 27 | 64 |

The above data show that the first statement, "I enjoy driving on freeways", did little to differentiate between auto and transit

users. Statements 2, 3, and 5--all of which deal with the irritation factor associated with driving on a congested freeway--elicited a higher percentage of agreement from transit users than from auto users, but in each case a substantial portion of auto users agreed with these statements as well. The fact that almost two-thirds of the auto users agreed with the fourth statement, "If public transportation were more convenient, I would prefer to take the bus to work", may point to an as yet untapped market for the busway.

The statement which elicited the greatest difference in response was the last one, "If I could drive downtown at 60 MPH, I would not consider taking a bus downtown to work." The fact that 64% of the busway riders disagreed with this statement indicates their high preference for transit commuting, regardless of freeway conditions. (However, in a previous on-board survey of peak-period, peak-direction busway riders, 43% of those surveyed gave "freeway too congested" as one of their main reasons for using the busway. See Second Year Report, Chapter VI.)

Drivers of Single Occupany Autos vs. Carpoolers

Using the six attitude measures discussed above, Table 11 compares the responses of those commuters who drive alone with the responses of those who carpool. Again, the "agree" and "disagree" responses have been aggregated, and "no opinion" responses have been omitted.

As the table indicates, the attitude statements which elicited the greatest difference in response were the last three, those which deal with a preference for using public transit under certain conditions. Overall, as might be expected, there was considerably

less difference between those who drive alone and those who drive with others than between auto and bus commuters.

Table 11

ATTITUDE MEASUREMENTS BY SINGLE OCCUPANT CARS AND CARPOOLS

| | % Agreeing | | % Disagreeing | |
|---|---|---|---|---|
| | Alone | Carpool | Alone | Carpool |
| 1. Enjoy freeway driving | 54 | 44 | 36 | 40 |
| 2. Morning traffic irritating | 57 | 57 | 36 | 32 |
| 3. Feel tense driving under 30 MPH | 40 | 40 | 47 | 44 |
| 4. Prefer convenient public transportation | 61 | 70 | 31 | 26 |
| 5. Prefer bus to driving in stop-and-go traffic | 64 | 74 | 25 | 13 |
| 6. If able to drive 60 MPH, would not take bus | 61 | 56 | 25 | 35 |

Attitude Measurements by Demographics

Table 12 on the following page indicates for each attitude statement the particular demographic group which deviates most from the mean score of all commuters (if the difference is significant at a 95% confidence level).

Table 12

MEAN ATTITUDINAL SCORES FOR SELECTED DEMOGRAPHIC GROUPS

| Statement | Mean Score All Commuters* | Sex | Age | Income ($000) | Number of Cars in Household |
|---|---|---|---|---|---|
| 1. Enjoy freeway driving | 2.9 | --- | --- | <10** 2.3 | --- |
| 2. Morning traffic irritating | 2.5 | --- | >40 2.7 | 10-15 2.8 | >3 3.2 |
| 3. Feel tense driving under 30 MPH | 2.8 | Female 2.6 | >40 3.0 | >30 3.0 | 3 3.1 |
| 4. Prefer convenient public transportation | 2.2 | Male 2.4 | >40 2.5 | >30 2.7 | >3 3.4 |
| 5. Prefer bus to driving in stop-and-go traffic | 2.1 | Female 2.0 | 16-29 2.2 | >30 2.5 | >3 1.9 |
| 6. If able to drive 60 MPH, would not take bus | 2.7 | --- | 16-29 2.4 | <10 2.1 | >3 2.2 |

* 1 = strongly agree, 2 = agree, 3 = no opinion, 4 = disagree, 5 = strongly disagree.

** This entry means that, of the four possible income groups, the group earning less than $10,000, with a mean score of 2.3, deviated the most from the average mean score of 2.9 for all commuters.

# VI. OFF-PEAK, REVERSE COMMUTE SURVEY

## SURVEY DESCRIPTION

### Purpose and Scope

The purpose of the off-peak, reverse commute survey was to determine how, and to what extent, the busway is being used other than for peak-period, peak-direction trips. As can be seen from the patronage graph (Figure 2 ), the busway serves a little over 10,000 person-trips during the peak direction commute hours. An on-board survey of these downtown commuters, conducted in November 1974, is discussed in the Second Year Report. The busway also serves an additional 5,000 riders who are traveling either in the non-peak direction during peak hours or in either direction during non-peak hours. The intent of this survey was to obtain information about these two groups of riders--who they are, why they use the busway, their trip patterns, and their attitudes and perceptions about busway service. The numbers of these reverse commute and off-peak riders as well as the benefits they are obtaining from busway service are relevant to the issue of whether the double lane facility, as opposed to a single lane busway is cost effective.

### Survey Design

The two groups were operationally defined as follows. Reverse commuters are those people traveling eastbound between 6 and 9 AM. They are traveling from Los Angeles to the suburbs at a time when most people are commuting to their jobs in downtown Los Angeles. The same group of riders would logically be found riding inbound during the evening peak; but, because

we wished to survey during only one of the two peaks, we arbitrarily chose the AM period to define them.

The off-peak riders were defined as those people riding the busway in either direction during the off-peak hours, i.e., between 9 AM and 4 PM and after 6:30 PM.

Only four of the nine busway lines serve these two groups: lines 60, 401, 402, and 404. The other five lines run only during the peak period and in the peak direction.

The questionnaire, which took about five minutes to complete, was printed on 8 1/2" X 14" paper, using both sides. A Spanish version was printed on a different color paper. (See Appendix B.)

The survey was administered by SCRTD checkers in May 1975, between downtown Los Angeles and the El Monte Station. The questionnaires were filled out while the passengers were riding the bus and collected as they deboarded.

## Sample Description

A total of 2,764 questionnaires were distributed on the 187 bus trips surveyed. The resulting 2,290 completed questionnaires produced an 83% response rate. Seven percent of the completed questionnaires were the Spanish version. The refusal rate (14%) was a good deal higher on this survey than the 4% refusal rate of the on-board commuter survey conducted six months earlier. As can be seen in the following table, the refusal rate was highest on line 60. This was also true during the on-board commuter survey. The overall higher refusal rate of the May survey, then, may be accounted for by the fact that line 60 represented 42% of the total sample, whereas in the earlier on-board survey, line 60 represented only 18% of the total sample. We don't know what's with line 60.

The distribution of completed questionnaires by bus line and direction was as follows:

Table 13

SAMPLE SIZE BY BUSLINE

| Line | Direction | Runs Surveyed | Questionnaires Distributed | Valid Returns | Response Rate |
|---|---|---|---|---|---|
| 60 | East* | 40 | 709 | 971 (42%) | .743 |
| | West** | 31 | 598 | | |
| 401 | East | 23 | 411 | 653 (29%) | .891 |
| | West | 20 | 322 | | |
| 402 | East | 26 | 351 | 486 (21%) | .914 |
| | West | 17 | 181 | | |
| 404 | East | 17 | 88 | 180 (8%) | .938 |
| | West | 13 | 104 | | |
| Totals | | 187 | 2764 | 2290 | |

* Outbound from Los Angeles
** Inbound to Los Angeles

RIDER PROFILES

The sample was composed of 324 reverse commuters and 1,966 off-peak riders. Following is the basic demographic data for these two groups compared with the commuter profiles taken from the November 1974 on-board survey.

| | Reverse Commuters | Off-Peak Riders | Downtown Commuters (Nov. 1974) |
|---|---|---|---|
| Percent Male | 55.4 | 55.3 | 45.9 |
| Average Age | 33.1 | 35.7 | 37.5 |
| Average Household Income | $12,200 | $13,200 | $17,500 |

There seems to be little difference between reverse commuters and off-peak riders; but, compared to downtown commuters, the two groups currently under discussion have a higher percentage of men and a lower income level. These riders are also younger, which is because of the higher percentage of students in both the reverse commute and off-peak groups, as is shown below, where the sample is divided into three groups.

| | Students (n=508) | Reverse Commuters (n=215) | Off-Peak Riders (n=1567) | Downtown Commuters (n=1933) |
|---|---|---|---|---|
| Percent Male | 53.5 | 60.0 | 55.3 | 45.9 |
| Average Age | 26.0 | 37.5 | 38.1 | 37.5 |
| Average Household Income | $12,300 | $13,300 | $14,400 | $17,500 |

It is worthwhile to note that neither the lower income level nor the higher percentage of men is affected by isolating student riders. However, to identify differences which might be affected by the student population, we will continue to isolate students as a separate group during the discussion of rider profiles.

An analysis of demographic data by bus line showed little significant variation except that line 60 had a higher proportion of low income persons, and line 404 had a higher proportion of women under thirty.

By Income Type

To obtain an accurate picture of a family's economic status, one must consider family size as well as annual income. Using these two criteria, we separated busway riders into two income groups, "probably poor" and "not poor". The "probably poor" group included single persons with annual incomes below $5,000

and couples with children at home and annual incomes below $10,000. The distribution of these two groups was:

| | Students (%) | Reverse Commuters (%) | Off-Peak Riders (%) | Downtown Commuters (%) |
|---|---|---|---|---|
| Probably Poor | 28.7 | 26.5 | 23.7 | N/A |
| Not Poor | 71.3 | 73.5 | 76.3 | N/A |

Riders classified as "probably poor" were most often unmarried women, under 30 who ride the bus because no car is available. Line 60 has the highest percentage of "probably poor" riders.

By Life Cycle

Several demographic descriptors (age, marital status, children at home) were integrated to produce a new, "Life Cycle" descriptor which has five categories:

| | |
|---|---|
| Single | Single, any age, no children; or divorced/widowed/separated, under 65 years old |
| Newly Married | Married, under 50 years old, no children |
| Full Nest | Married with children at home |
| Empty Nest | Married, age 50 or older, no children at home |
| Sole Survivor | Divorced/widowed/separated, age 65 or older |

Because of missing data, it was impossible to categorize 334 respondents. However, with the information which was available, the five categories defined above were distributed as follows:

Table 14

LIFE CYCLE CATEGORIES

| Category | Students (n=437) (%) | Reverse Commuters (n=182) (%) | Off-Peak Riders (n=1337) (%) | Downtown Commuters (n=889) (%) |
|---|---|---|---|---|
| Single | 66.6 | 34.6 | 29.9 | 20.2 |
| Newly Married | 7.6 | 10.4 | 9.3 | 14.5 |
| Full Nest | 24.3 | 45.1 | 49.4 | 48.6 |
| Empty Nest | 0.9* | 5.5 | 7.6 | 16.0 |
| Sole Survivor | 0.7* | 4.4* | 3.8 | 0.7* |

* Sample size less than 10.

The data show higher percentages in the first and last life cycle categories for reverse commute and off-peak groups than for downtown commuters.

By Car Availability

Almost half of the students and reverse commuters, and over one-third of the off-peak riders, are "captive" riders. These figures contrast sharply with the downtown commute group, only 11% of whom said that they had no car available for the trip.

| Car Available? | Students (%) | Reverse Commuters (%) | Off-Peak Riders (%) | Downtown Commuters (%) |
|---|---|---|---|---|
| No; bus only practical means | 46.9 | 45.7 | 35.4 | 11.1 |
| Yes, but with inconvenience to others | 15.2 | 13.2 | 12.7 | 9.1 |
| Yes, but I prefer to take the bus | 37.9 | 41.1 | 52.0 | 79.8 |

However, it is important to note that a good portion of the reverse commute and off-peak riders live in the central city where transit is available. Thus, they may seem more transit dependent than they actually are. In many cases they may not own an automobile because they don't need one, rather than because they can't afford one. In contrast, downtown commuters who are all coming from suburbia more accurately reflect automobile dependency.

Car availability is also influenced by age, as is shown below.

| Car Available? | Age Under 20 | 21-29 | 30-39 | 40-49 | 50-64 | 65 & Over |
|---|---|---|---|---|---|---|
| No; bus only practical means | 50.5 | 43.5 | 27.7 | 27.6 | 30.8 | 50.0 |
| Yes, but with inconvenience to others | 15.8 | 15.2 | 12.1 | 11.1 | 8.8 | 15.2 |
| Yes, but I pre- to take the bus | 33.6 | 41.3 | 60.1 | 61.3 | 60.4 | 34.8 |

The distribution of cars was as follows:

| Number of Cars | Students (%) | Reverse Commuters (%) | Off-Peak Riders (%) | Downtown Commuters (%) |
|---|---|---|---|---|
| 0 | 19.8 | 24.2 | 18.8 | 3.8 |
| 1 | 34.4 | 39.0 | 34.0 | 33.5 |
| 2 | 29.2 | 27.5 | 35.0 | 47.5 |
| 3 | 11.1 | 6.0 | 8.6 | 11.4 |
| 4+ | 5.4 | 3.2 | 3.5 | 3.7 |
| Mean | 1.5 | 1.3 | 1.5 | N/A |
| Median | .88 | .66 | .92 | 1.27 |

Summary

The idea, sometimes presented in transportation literature, that off-peak bus users are either affluent, suburban women who use the bus for downtown shopping trips or poor, unskilled, innercity minorities traveling to jobs in the suburbs, is not borne out by our data. Rather, the data show that there is little income difference among the sub-groups of off-peak users and that, although their average annual income ($13,100) is lower than that of the downtown commuter group ($17,500), it is far above the poverty level.

The survey data also indicate that both the reverse commute and the off-peak groups are comprised of people from all socio-economic strata. Not a narrow demographic group, it is well represented in both sexes and in all age groups and income levels. However, there are slightly higher percentages in the young and over 65 categories than in the downtown commute group. These two categories would seem to have the highest degree of transit dependency.

## TRIP PROFILES

For this section and those which follow, we will continue to divide the sampled riders into two groups: reverse commuters (324) and off-peak riders (1,966).

### By Trip Purpose

Work is the primary trip purpose of both reverse commute and off-peak groups. A high percentage of the first group are students coming from Los Angeles to attend California State College. Access to the campus is facilitated by the on-line College Station. (See Table 15.)

Table 15

TRIP PURPOSE

| Trip Purpose | Reverse Commuters (%) | Off-Peak Riders (%) | Downtown Commuters (%) |
|---|---|---|---|
| Work (or work-related trip) | 49.1 | 49.0 | 94.6 |
| School | 37.6 | 20.2 | 2.4 |
| Social | 8.2 | 10.8 | 0.1 |
| Shopping | 0.9 | 5.6 | 0.1 |
| Personal Business | 1.2 | 7.1 | 1.4 |
| Other | 3.0 | 7.4 | 1.4 |

Below is the distribution of work purpose by life cycle category:

| Trip Purpose | Single (%) | Newly Married (%) | Full Nest (%) | Empty Nest (%) | Sole Survivor (%) |
|---|---|---|---|---|---|
| Work or Work Related | 33.6 | 60.4 | 64.3 | 54.2 | 10.3 |
| School | 39.1 | 19.0 | 12.8 | 3.8 | 5.2 |
| Social | 12.9 | 7.5 | 6.4 | 9.5 | 39.7 |
| Shopping | 1.7 | 1.1 | 4.1 | 10.5 | 24.1 |
| Personal Business | 5.1 | 4.0 | 7.5 | 8.6 | 3.4 |
| Other | 7.5 | 8.0 | 5.1 | 13.3 | 17.2 |

The data show a high percentage of single people using the bus to get to school; those people in the prime work years category using the bus to get to work; and older persons using the bus primarily for social and shopping purposes.

By Origin/Destination

The busway lines serve people traveling between downtown Los Angeles and the San Bernardino Freeway Corridor. (See

Figure 1.) There are nine busway lines, but only four serve the two groups of people covered in this survey. Three of these lines (60, 401, and 402) are long lines running to the eastern extremes of the corridor (e.g., line 60 goes to San Bernardino, approximately 60 miles east of downtown Los Angeles). The other line, 404, is a shorter one terminating in South Arcadia. Already knowing that the western origin or destination is, of course, the downtown Los Angeles area (with some people transferring to points beyond), we needed to know the origin and destination of trips within this eastern corridor. To obtain this information, we asked riders to state their eastern origins or destinations. The answers were tabulated by 34 different city locations, and one catch-all category labeled "Other". The 35 locations were then aggregated into eight geographical areas as follows:

| Group | Location |
|---|---|
| 1 | Those at or in the vicinity of California State University |
| 2 | Those with easy access to the El Monte Station |
| 3 | Those with easy access to the San Gabriel Park-and-Ride Station |
| 4 | Those on the northern boundary of the corridor (e.g., Monrovia, Arcadia) |
| 5 | Those east of the El Monte Station but with easy access to lines 401 and 402 (e.g., West Covina, Pomona) |
| 6 | Those in the distant east (e.g., Ontario, San Bernardino) |
| 7 | Those south of the Pomona Freeway (e.g., Whittier) |
| 8 | Those who do not fall within the 34 tabulated locations; the "other" group |

The percentage breakdown of these eight geographical groups was as follows:

| | Reverse Commute AM Trip End (%) | Off-Peak Trip Ends (%) |
|---|---|---|
| California State | 22.9 | 6.4 |
| Easy Access to El Monte | 16.8 | 26.2 |
| Easy Access to San Gabriel | 1.0 | 0.7 |
| Northern Boundary | 0.7 | 4.1 |
| Easy Access to 401, 402 | 40.1 | 45.6 |
| Distant East | 13.8 | 11.4 |
| South of Pomona Freeway | 0.7 | 0.7 |
| Other | 4.0 | 4.9 |

By Access Mode

To get to a busway bus, almost two-thirds of the reverse commuters, all of whom board in downtown Los Angeles, transfer from another bus. In contrast, only one-third of the off-peak riders use this access mode. More off-peak riders walk to the bus than do reverse commuters, probably because many off-peak riders come from suburbia, where busway routes run through residential areas.

| Access Mode | Reverse Commuters (%) | Off-Peak Riders (%) | Downtown Commuters (%) |
|---|---|---|---|
| Transferred from another bus | 63.7 | 32.9 | 5.3 |
| Walked | 18.1 | 27.8 | 22.9 |
| Drove car and parked | 8.8 | 24.1 | 53.7 |
| Driven by someone else | 10.6 | 13.1 | 16.7 |
| Took taxi | 0.3 | 0.6 | 0.9 |
| Other | 0.3 | 1.4 | 0.4 |

The above data indicate a significant number of off-peak riders drive an automobile to the busway service. Further investigation of the survey results show that 40% of these people park their car at El Monte; the rest noted their parking location as "shopping center", "on the street", or "other".

By Egress Mode

After getting off the bus, 61% of the reverse commuters and 42% of the off-peak riders walk to their destinations. Both groups have a significant percentage of people who transfer to another bus to reach their destinations.

| Egress Mode | Reverse Commuters (%) | Off-Peak Riders (%) | Downtown Commuters (%) |
|---|---|---|---|
| Walk | 59.6 | 42.3 | 83.0 |
| Transfer to another bus | 29.3 | 34.8 | 15.7 |
| Drive in car, parked near bus stop | 5.2 | 13.9 | 0.9 |
| Picked up by car | 4.9 | 7.2 | 0.3 |
| Other | 0.9 | 1.0 | 0.0 |

PATTERNS AND TRENDS OF RIDER BEHAVIOR

Trip Frequency

Over two-thirds of the reverse commute group are regular riders; that is, they use the busway at least four times a week. Over half of the off-peak riders indicated that they also use the bus regularly. These percentages correlate well with the trip purpose responses.

| | Reverse Commuters (%) | Off-Peak Riders (%) | Downtown Commuters (%) |
|---|---|---|---|
| Regular riders (at least 4 rides per week) | 67.4 | 56.3 | 93.5 |
| Frequent riders (1-3 rides per week) | 15.9 | 18.7 | 4.5 |
| Occasional riders (less than 1 ride per week) | 16.8 | 25.0 | 2.0 |

Typically, the "regular bus rider" is most frequently male, 30-49 years old, earning an annual income of between $15,000 and $30,000. He is married and has children living at home. His trip purpose is work. He rides the bus by choice, getting to the busway by driving his car and parking it. Thus, in terms of socio-economic background, the typical regular rider appears to be similar to the typical downtown commuter.

The typical "occasional rider" is most frequently an unmarried woman, over 65 years old, earning less than $5,000 a year. Driven to the busway by someone else, she is a captive bus rider with no car available. Her trip purpose is social or obtaining personal services.

In terms of geographical groupings, those who use the busway to get to California State Universtiy have the highest percentage of riders who state that they are regular users (83%). Those living in the distant east have the highest percentage of occasional users (52%), with only 27% saying they use the busway regularly.

## Reasons for Using Busway

Table 16 lists the responses to the question "What are your main reasons for using the busway?" based on the percentage of individuals who listed that reason. The totals add to more than 100% because most people indicated more than one reason. (The reverse commute group listed 531 reasons, or an average

of 1.6 responses per person; the off-peak group listed 3,402 reasons or 1.7 per person. On the 1974 survey, the downtown commute group listed 4,126 reasons, or 2.1 per person.)

Table 16

REASONS FOR USING BUSWAY

| Reason for Using Busway | Reverse Commuters (%) | Off-Peak Riders (%) | Downtown Commuters (%) |
|---|---|---|---|
| Costs less | 45.4 | 50.7 | 65.2 |
| No other way | 35.7 | 28.4 | N/A |
| Saves time | 19.8 | 19.2 | 27.5 |
| Gives time to relax | 19.2 | 25.6 | 36.6 |
| Freeway too congested | 14.5 | 22.7 | 42.8 |
| Dislike driving | 10.9 | 13.7 | 20.1 |
| Allows someone else to use car | 6.5 | 7.9 | 7.2 |
| Other | 4.1 | 5.3 | 5.5 |
| Carpool broke up | 0.6 | 0.9 | 2.2 |
| Change in place of work | N/A | N/A | 6.3 |

The above data show that "cost savings" is the predominant reason given by all three groups but that the downtown commute group had a considerably higher percentage of riders giving this reason. The higher percentages given by downtown commuters to "costs less", "saves time", "gives time to relax", "freeway too congested", and "dislike driving" can be attributed to the fact that, were they not commuting by bus, they would be driving a car during peak-period, peak-direction traffic with its stop-and-go patterns and the attending frustration factors.

"No other way available" was the second most frequently listed reason for busway use by both reverse commute and off-peak groups. This is a reflection of the high percentage of

transit captives within these two groups, as reported earlier. The "no other way" choice was not included on the downtown commuter survey. However, fully half of those downtown commuters who replied "other" (which would amount to 2.7%) had no choice but to ride the bus, adding comments saying they didn't drive, had no car, or the car had broken down.

It is not readily apparent why the "saves time" reason ranks as high as it does (third for reverse commuters, fifth for off-peak riders) since neither of these groups would be driving during crowded freeway periods if they were not using the busway. Thus, their perception may be due to the efficient operation of the busway system. Buses are cruising unimpeded at 55 MPH, which may be perceived as a time-saving factor, even if such is not the case.

The data below indicate for each reason for using the busway the particular groups for whom that reason was most important. For each of the five criteria used, the busway users are split into categories, according to that criterion. The percentage of users in each category is compared to the percentage of users in that category who indicated that a particular reason was important for them. The demographic group which shows the greatest difference between the second percentage and the first percentage is concluded to be that segment which is most apt to use the busway for the reason in question. If no groups show a difference of at least 7%, it can be concluded that this reason for using the busway cuts across all segments, e.g., across both sexes, all age groups, and all income levels.

| Reason for Using Busway | Sex | Age | Marital Status | Income | Car Availability |
|---|---|---|---|---|---|
| Costs less | -- | -- | Married | $15-30,000 | Yes |
| No other way | F | <21 | Single | under $5,000 | No |
| Saves time | F | -- | -- | -- | -- |
| Gives time to relax | M | -- | Married | $15-30,000 | Yes |
| Freeway too congested | -- | -- | Married | $15-30,000 | Yes |
| Dislike driving | -- | -- | Married | -- | Yes |
| Allows someone else to use car | -- | 30-39 | Married | $15-30,000 | Yes, but* |

*Yes, but with considerable inconvenience to others

The "carpool broke up" reason has been omitted because of the sparsity of responses.

Alternate Mode Available

Riders were asked how they would have made their trips if the busway service did not exist. The distribution of responses was as follows:

| Alternative to Bus | Reverse Commuters (%) | Off-Peak Riders (%) |
|---|---|---|
| Drive my car | 32.9 | 47.2 |
| Use another bus | 28.2 | 17.5 |
| Get a ride with someone | 21.0 | 18.0 |
| Wouldn't make trip | 14.4 | 12.3 |
| Take a taxi | 0.0 | 0.5 |
| Other | 3.4 | 4.5 |

By geographical grouping, over half (54%) of those from Cal State said they would use another bus if busway service did

not exist. Those from the distant east were almost evenly divided among driving a car, getting a ride with someone, taking another bus, and not making the trip. The majority of all other groups said they would drive their cars as an alternate mode.

The following data indicate for each possible alternate mode, the particular group for whom that mode was most available.

| Alternative to Bus | Sex | Age | Marital Status | Income | Car Availability |
|---|---|---|---|---|---|
| Drive car | M | -- | Married | $15-30,000 | Yes |
| Another bus | F | -- | Single | <$5,000 | No |
| Ride with | F | -- | Single | <$5,000 | No |
| Not make trip | F | >65 | D/W/S* | <$5,000 | No |
| Other | M | <20 | Single | -- | No |

*Divorced/widowed/separated.

## Relationship of Car Availability to Bus Ridership

It has often been assumed that bus riders are primarily transit-dependent people, that is, they ride the bus because no other mode is available to them. To measure the relationship between car availability and bus ridership, we included a question in this and previous on-board surveys which asked the rider, "Was a car available to you for this trip?", to which there were three possible responses: "No, bus only practical means"; "Yes, but with considerable inconvenience to others"; and "Yes, but I prefer to take the bus".

The responses given below are taken from three on-board surveys of San Bernardino Freeway Corridor bus riders:

| Car Available? | Pre-Busway 4/72 (%) | Downtown Commuters 11/74 (%) | Reverse Commuters and Off-Peak Riders 5/75 (%) |
|---|---|---|---|
| No | 52.3 | 11.1 | 39.0 |
| Yes, but with inconvenience to others | 15.3 | 9.1 | 13.3 |
| Yes, but prefer bus | 32.4 | 79.8 | 47.7 |

These figures indicate that ridership patterns are changing. Although the busway still serves a large group of transit-dependent people, nearly 80% of the downtown commuters and almost half of the reverse and off-peak riders ride the busway by choice.

As would be expected, there is a definite relationship between car availability and the number of cars owned per household. (These figures are from the May, 1975, survey only.)

| | Car Available? | | |
|---|---|---|---|
| # Cars in Household | No (%) | Yes, but (%) | Yes (%) |
| 0 | 86.1 | 6.7 | 7.2 |
| 1 | 39.1 | 17.6 | 43.3 |
| 2 | 18.6 | 13.0 | 68.3 |
| 3 | 18.3 | 13.1 | 68.6 |
| 4+ | 9.8 | 11.0 | 79.3 |

Persons without the choice of traveling by auto tend to be unmarried women under 20 years of age with annual incomes under $5,000. Those stating that they ride the bus by choice are more frequently married men with annual incomes between $15,000 and $30,000. Additionally, the data indicate that there are significant numbers of transit captives, at least for some of their trips, in two and three car households.

## RIDER ATTITUDES AND PERCEPTIONS TOWARDS BUSWAY SERVICE

### Importance of Busway Features

Passengers were asked to rank the importance of four busway features using a scale of 1 to 4 (1 meaning extremely important, 4 meaning no importance). The distribution of their responses in the order of preference is as follows. There were no significant differences based on sex, age, or bus line.

| Feature | Average Rating | | | Percent Rating Extremely Important | | |
|---|---|---|---|---|---|---|
| | Reverse Commuters | Off-Peak Riders | Downtown Commuters | Reverse Commuters | Off-Peak Riders | Downtown Commuters |
| Reduction of fare to 25¢ | 1.4 | 1.4 | 1.3 | 75.0 | 77.2 | 80 |
| Present frequency of service | 1.5 | 1.5 | 1.5 | 63.4 | 65.8 | 60 |
| Air-conditioned buses | 2.0 | 1.9 | 2.2 | 40.7 | 43.1 | 29 |
| El Monte Terminal | 2.5 | 2.1 | 2.1 | 33.8 | 46.8 | 45 |

Passengers were also given the opportunity to write in other busway features which they felt were important. A total of 35 different features were mentioned. The six most frequently listed were:

| | Times Listed |
|---|---|
| Speed, shorter trip | 20 |
| Stop at Cal State | 20 |
| Route close to home or downtown destination | 12 |
| Convenience | 8 |
| Courteous, friendly drivers | 7 |
| Special busway lanes | 7 |

## Advertising Effects

Table 17 gives the distribution of multiple choice responses to the question asking in what ways passengers found out about busway service. Totals add to more than 100% because some people indicated they had heard of the busway from more than one source.

Table 17

EFFECTIVENESS OF ADVERTISING METHODS

| Information Source | Reverse Commuters (%) | Off-Peak Riders (%) | Downtown Commuters (%) |
|---|---|---|---|
| Friends | 24.8 | 27.5 | 37.7 |
| RTD schedules, brochures | 24.5 | 24.0 | 16.9 |
| RTD phone information | 27.1 | 18.7 | 10.9 |
| Saw bus on busway or street | 12.1 | 17.5 | 17.1 |
| Newspaper | 13.0 | 13.2 | 21.7 |
| Television | 6.5 | 9.3 | 15.0 |
| Information on other buses | 7.0 | 6.7 | 4.0 |
| Radio | 4.1 | 6.8 | 11.8 |
| Other | 7.0 | 5.4 | 5.0 |
| Billboards | 4.7 | 4.1 | N/A |
| Transit Information Team | N/A | N/A | 2.4 |

## Passenger Comments

Space was provided on the questionnaire for passengers to write in any comments they might have about busway operations. Of the 2,290 passengers surveyed, 914 or 40% wrote in at least one comment, and 207 or 7% made multiple comments. These responses were coded using a total of 43 categories plus an indication of whether the response was positive, negative, or neutral. The breakdown by these categories is shown

below for the 914 first comments.

| | Reverse Commuters (n = 324) | | Off-Peak Riders (n = 1966) | | Downtown Commuters (n = 1933) | |
|---|---|---|---|---|---|---|
| | % of Comments | % of Psngrs. | % of Comments | % of Psngrs. | % of Comments | % of Psngrs. |
| Favorable | 26.2 | 8.3 | 27.5 | 11.3 | 20.9 | 9.6 |
| Neutral | 37.9 | 12.0 | 41.2 | 17.0 | 56.6 | 26.1 |
| Unfavorable | 35.9 | 11.4 | 31.3 | 12.9 | 22.5 | 10.3 |
| No comment | | 68.2 | | 58.7 | | 54.0 |

This distribution seems to indicate that downtown commuters are more satisfied with busway operations than are the reverse commute and off-peak groups. However, these two sub-groups indicate a generally favorable attitude towards the busway, since taken in aggregate, only 13% of all passengers criticized the busway when given an opportunity to do so.

The breakdown of all comments by type, including first and second comments, is given below.

| Subject Category | Favorable | Neutral | Unfavorable | Total |
|---|---|---|---|---|
| General | 212 | 58 | 80 | 350 |
| Scheduling/Service | 22 | 278 | 96 | 396 |
| Operators | 35 | 13 | 65 | 113 |
| Routes and Stops | 2 | 45 | 22 | 69 |
| El Monte Station | 1 | 12 | 17 | 30 |
| Equipment | 14 | 28 | 69 | 111 |
| Public Information | 1 | 16 | 15 | 32 |
| Fare | 16 | 2 | 0 | 18 |
| Totals | 304 | 452 | 364 | 1120 |
| % of all comments | 27.1 | 40.4 | 32.5 | |

The greatest number of responses dealt with requests for more service: night service, Sunday service, midday and peak

period service, express service, weekend service, and more park-and-ride facilities. (Since the time that this survey was conducted, two new park-and-ride facilities have been established at Eastland and Pomona.) The second greatest number of responses dealt with requests for more busway and/or feeder routes.

Positive comments were mostly of a general nature, e.g., "Glad you care!" and "I think you bus people know what you're doing." Complaints most frequently cited dealt with the behavior of other passengers (e.g., smoking), driver discourtesy, and the lack of air-conditioning in the buses.

APPENDIX A

TABLE OF CONTENTS

# APPENDIX A

## INTRODUCTION

The attachments in this appendix provide additional background information on service and operational characteristics of the busway routes.

## SERVICE AREA

As noted elsewhere, the hub of the El Monte-Los Angeles Busway system, the El Monte Station--located within the City of El Monte--is about 12 miles east of the Los Angeles Civic Center. The Civic Center is located at the northern edge of the CBD. The CBD is bounded generally by the Santa Ana Freeway on the north, the Harbor Freeway on the west, the Santa Monica Freeway on the south, and Alameda Street on the east.

Los Angeles CBD

| Area | Daytime Employment | Employment Density |
|---|---|---|
| 5.93 square miles | 200,000 | 33,726 employees per square mile |

The boundaries of the study area in the San Gabriel Valley (which encompasses the primary passenger shed area for the nine busway lines) are as follows: Huntington Drive and the 210 Freeway on the north, Long Beach Freeway on the west, Pomona Freeway on the south, and Azusa Road on the east. For the period reported herein, busway lines have not served the area west of the Del Mar Boulevard bus ramps in San Gabriel. Excluding the not-served area west of San Marino and Garfield Boulevards (which is about 1 mile west of Del Mar Boulevard) the following pertains to the remaining area with the boundaries of Huntington Drive, 210 Freeway, Azusa Road and the Pomona Freeway:

| Area | Population | Density |
|---|---|---|
| 107 square miles | 425,000 | 3961 persons/sq. mile |

Between the Long Beach Freeway and the Los Angeles CBD, within the corridor, are the communities generally referred to as East Los Angeles. A portion of this area is within the City of Los Angeles and a portion is unincorporated under the jurisdiction of Los Angeles County. This is one of the lower income

areas of the metropolitan area and has the highest concentration of Spanish surname persons in the County. Both the University and Medical Center Busway stations are located in this area. These two stations are approximately four and a half and two and a half miles east of the Los Angeles CBD Civic Center, respectively. As expected, there has been negligible use of the busway by East Los Angeles residents for trips to the Los Angeles CBD. This is due to the close proximity of the area to the CBD, coupled with the high level of transit service on routes parallel to the busway. Further, due to the hilly terrain and lack of through arterial streets there is very poor accessibility to the University Station, outside of the University Campus itself.

## SERVICE CHARACTERISTICS

The one great service advantage of a busway over a fixed guideway (rapid transit) line is the ability to provide trunk line and feeder/distribution service without requiring a change of vehicles.

Maximum use was made of this inherent advantage of a busway in the design of the busway routes. During peak periods all nine routes are through-routed between the CBD and their suburban terminals. Of the six lines fanning out from the El Monte Station, four provide through service all day and two are cut back during the off-peak period to operate as shuttles between the Station and their suburban terminals. The three lines using the Del Mar bus ramp operate only during the peak periods, as do the two park/ride lines. A substantial number of reverse commute trips are operated on the six lines serving the El Monte Station.

Line 60, one of the six lines serving the El Monte Station, consists of three branches (60G, Upland; 60F, San Bernardino via Riverside; and 60E, Express to Riverside and San Bernardino) whose one-way route lengths are, respectively, 43 miles, 71.5 miles, and 71.5 miles. This line handles both local and interurban type passenger trips. A substantial portion of Lines 401 and 402, both terminating in Pomona, also extend beyond the study boundary of Azusa Road.

At the downtown end of the busway system, four separate distribution routes are used for the six routes entering at El Monte, the three routes entering at the Del Mar ramp, and the two park/ride lines.

As noted in the summary patronage fact sheet, frequency of service during the peak hour is better than 1 per minute in the prevailing direction of traffic. Midday service is also frequent, with 8 trips per hour in each direction or one trip every 7 1/2 minutes. Weekend and evening service is provided but at substantially reduced service levels. No local riding is permitted on the Busway lines within the Los Angeles CBD and the Wilshire corridor.

## SERVICE EXPANSION IN THE SAN GABRIEL VALLEY

The nine routes described herein were established in July, 1973, when the El Monte Busway Station opened. In the summer of 1975, two park/ride lines from Eastland Center and Pomona were established. All of the data in the consultant's report pertains to this service.

Effective April 11, there was a major expansion of non-busway local service and a complete rearrangement of all the above nine established lines. Except for a current patronage table and graph in this appendix, all Busway information in this report and in Appendix A refers to the Busway system as it was before April 11, 1976.

## PATRONAGE COUNT METHOD

The patronage counts cited are screen line counts of passengers passing through Medical Center Station. Although no local riding is permitted on busway lines within the downtown area and Wilshire Boulevard, there is significant local riding east of El Monte. The table below indicates the ratio between screen line counts and total number of passengers boarding busway lines. The total boarding count includes passengers who have transferred from one to another busway bus at El Monte Station. Data from the Second Year Report found 8.9% transfer AM inbound and 27% transfer PM outbound, between busway buses at El Monte Station. Taking an average of these percents and assuming midday transfer rate is the same, 18% from total boardings was deducted to account for internal passenger transfers.

BUSWAY PASSENGER COUNTS

| Lines | Screen Line Count on Busway (At Medical Center Station) Oct. 16, 1975 | Total Passengers Boarding Lines Fall, 1975 | Percent Screenline Count of Total Riders |
|---|---|---|---|
| | (ENTERING BUSWAY AT ELMONTE STATION) | | |
| 60 | 4199 | 6510 | 64.5 |
| 401 | 2960 | 5260 | 56.3 |
| 402 | 2802 | 5120 | 54.7 |
| 403 | 1418 | 3350 | 42.3 |
| 404 | 1242 | 1450 | 85.7 |
| 405 | 687 | 990 | 69.4 |
| | (PARK/RIDE) | | |
| 760 | 520 | 520 | 100.0 |
| 764 | 150 | 150 | 100.0 |
| | (ENTERING BUSWAY AT DEL MAR AVENUE BUS RAMP) | | |
| 52F | 316 | 348* | 90.0 |
| 53F | 617 | 674* | 90.0 |
| 63F | 173 | 190* | 90.0 |
| TOTAL | 15084 | 24567 | 61.4 |
| Less 18% to account for internal busway transfers | | 3779 | |
| | | 20788 | |

* 10% added for assumed additional local riding east and north of Del Mar off ramps.

EL MONTE BUSWAY

Patronage Growth - May 1976

| | Dec. 72 Before Busway (Lines 60&53L) | April 1'76 Busway Prior to S.G.Valley Service Expansion | May 6 Busway After San Gabriel Valley Service Exp.(Eff. Apr.11) All Svc. Except Pasadena | Pasadena Lines via Long Beach Freeway (483&485) | Total | % Increase Between Dec. 1972 and May'76 (Includes Pas.Service) | % Increase Between April 1, 1976 & May 6, 1976 (Includes Pas. Service) |
|---|---|---|---|---|---|---|---|
| **Passengers** | | | | | | | |
| Peak Period Riding | 1,200 | 10,710* | 10,456 | 1,589 | 12,045 | 904% | 12.5% |
| Off-Peak Riding | 800 | 4,849 | 4,884 | 1,997 | 6,881 | 760% | 41.9% |
| Total or Average | 2,000 | 15,551* | 15,340 | 3,586 | 18,926 | 846% | 21.7% |
| **Bus Trips** | | | | | | | |
| Peak Period Riding | 30 | 268 | 289 | 41 | 330 | | |
| Off-Peak Riding | 42 | 223 | 343 | 152 | 495 | | |
| Total or Average | 72 | 491 | 632 | 193 | 825 | | |
| **Average Passengers Per Trip** | | | | | | | |
| Peak Period Riding | 40.0 | 40.0 | 36.2 | 38.8 | 36.5 | | |
| Off-Peak Riding | 19.0 | 21.7 | 14.2 | 13.1 | 13.9 | | |
| Averages | 27.8 | 31.7 | 24.3 | 18.6 | 22.9 | | |

Additional Patronage Information - May 1976

On Line Stations

Number of Passengers Boarding and Alighting

| | All Svc. Exc.Pas. | Pasadena (483&485) | Total |
|---|---|---|---|
| Med.Ctr. | 740 | 160 | 900 |
| Univ. | 1,680 | 520 | 2,200 |

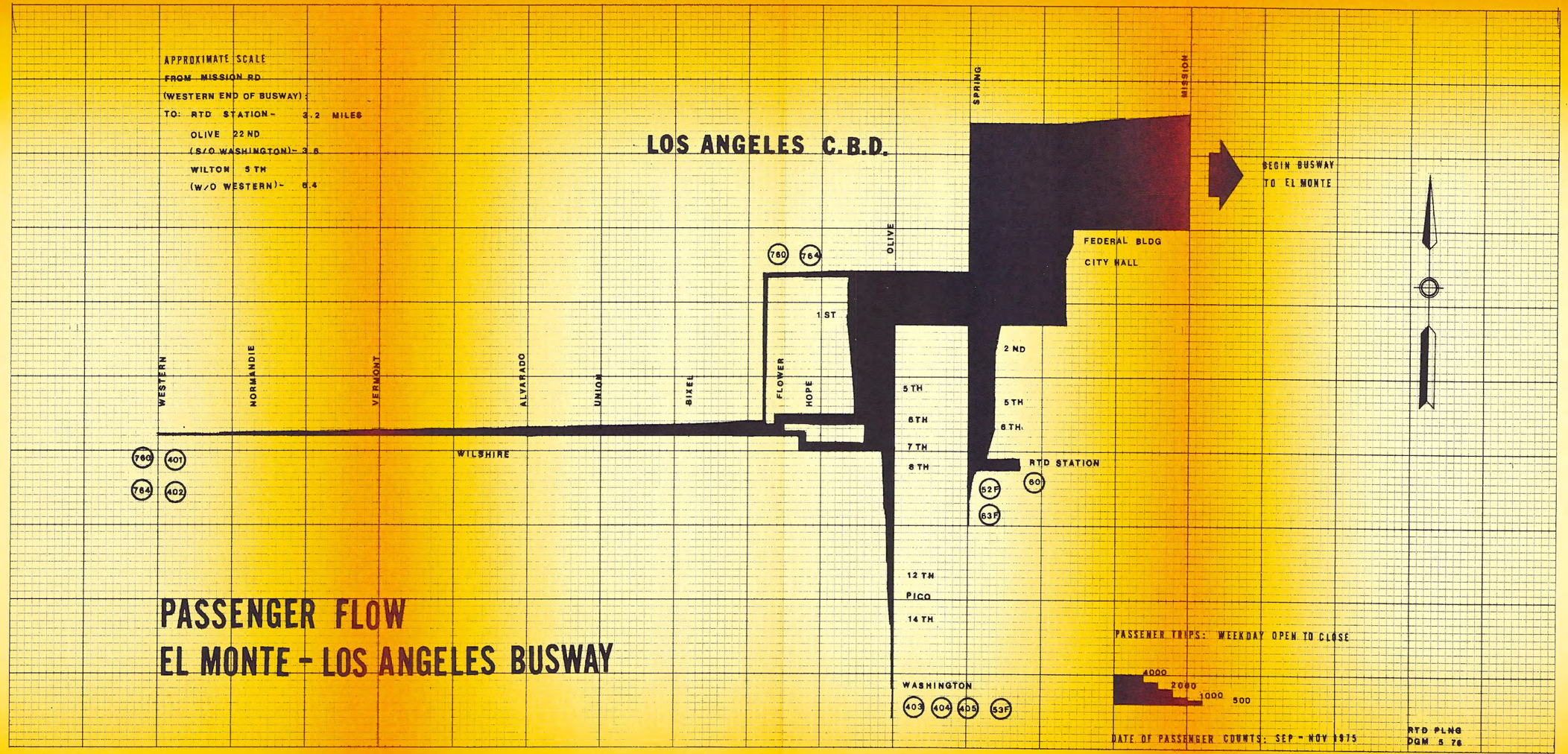
Peak Hour Patronage

| | Inbound (AM) All Svc. Exc.Pas. | Inbound (AM) Pasadena (483&485) | Inbound (AM) Total | Outbound (PM) All Svc. Exc.Pas. | Outbound (PM) Pasadena (483&485) | Outbound (PM) Total |
|---|---|---|---|---|---|---|
| Psgr. | 3044 | 423 | 3467 | 2835 | 388 | 3223 |
| Bus Trips | 64 | 9 | 73 | 63 | 9 | 72 |
| Av. Psgr. Trip | 47.6 | 47.0 | 47.5 | 45.0 | 43.1 | 44.8 |

Peak Hour Average Headway (Includes Pasadena Service) : Inbound-AM: Every 49 seconds; Outbound-PM: Every 50 seconds

NOTE: *17-Hour April 1, Count = 15201 + 350 for Line 764 = 15,551. As of April 22, 764 count is included in Busway Ridership Count.
Only counts in prevailing direction of riding included in peak period counts. Peak period flow in reverse direction included as part of off-peak period counts.
Peak period: Inbound AM - 6:00AM - 9:00 AM; Outbound PM -4:00 PM - 6:30PM.

DM/cor
Planning: 5/17/76




# PASSENGER FLOW
# EL MONTE - LOS ANGELES BUSWAY

## EL MONTE STATION PARKING LOT USAGE

### Time Series Parking Lot Usage

Completion of the second 700 permanent spaces occurred about April 1, 1976. However, the impact of the expansion of the parking lot from 700 permanent and 300 temporary spaces to 1400 permanent spaces was a gradual one which extended over more than a three-month period. This was due to the opening of the new parking lot and phasing out of the temporary spaces in several steps. As shown on the graphs, the parking lot time series does not indicate a clear trend as a result of the expansion of the El Monte parking lot.

### Parking Lot Fill Up Rate

Also shown are graphs showing the rate, by 30-minute time periods, at which the El Monte parking lot fills up.

As reported in the Second Year Report, during February, 1975, the time required to park and walk to the station platform was clocked, in order to compare total auto versus transit travel time. The park/ride time losses were computed to be 3.1 minutes from 6:30 to 7:00 a.m., 4.2 minutes from 7:00 to 8:00 a.m., and 6.3 minutes from 8:00 to 9:00 a.m. Due to probable shorter walking distances and less time spent in cruising parking areas looking for vacant spaces, access time may now be less than that computed above.

### Proportion of Total Busway Riders Entering Busway System at El Monte Station

Because of the impressive size of the El Monte station and parking lot, some observers might assume that the majority of users enter the busway system at the station. In fact, about 25 percent of total users do.

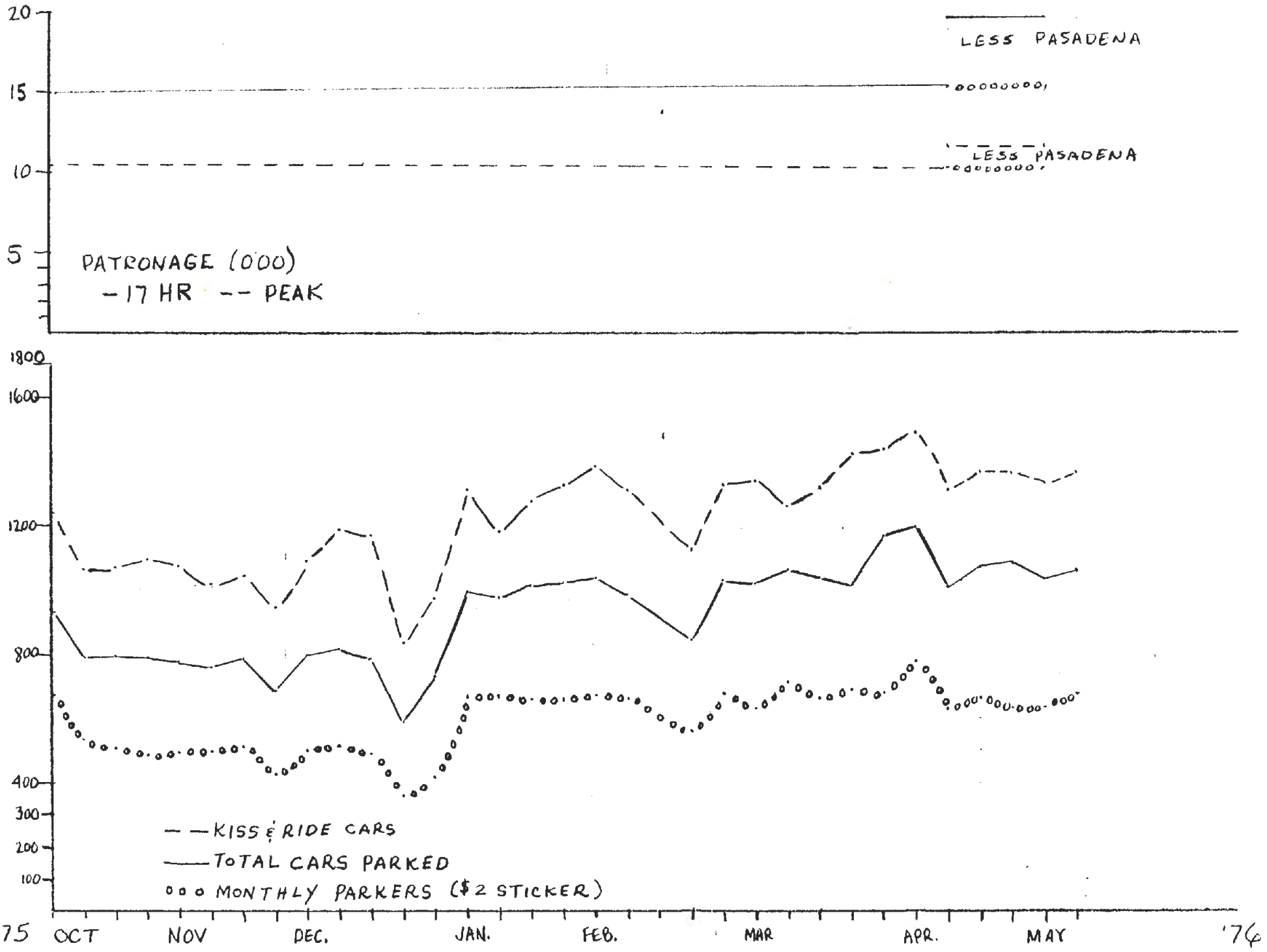
Because there are significant numbers of passengers transferring between busway buses at the El Monte Station, estimated from derived figures in the Second Year Report to be 18 percent, boarding checks at the station do not tell the whole picture. It is believed that the number of riders walking to the El Monte Station is zero or negligible. With this understanding, the parking and kiss-and-ride (drop off) counts show total persons entering at El Monte Station.

| | El Monte Users Compared to All-Day Patronage (15,500÷2=7750) | El Monte Users Compared to Peak-Period Patronage (10,500÷2=5250) |
|---|---|---|
| Parkers | $\frac{1060}{7750} = 13.7\%$ | $\frac{1060}{5250} = 20.2\%$ |
| Parkers and Kis-and-Riders | $\frac{1363}{7750} = 17.6\%$ | $\frac{1363}{5250} = 25.0\%$ |

The figure 25.0% compares to a 25.5% equivalent figure derived from mode of access as stated by passengers in on-board survey November, 1974. In that survey, 54.5% of the passengers surveyed reported they drove and parked to access the busway, of which group, 46.8% said they parked at El Monte Station. (54.5 x 46.8 = 25.5%)

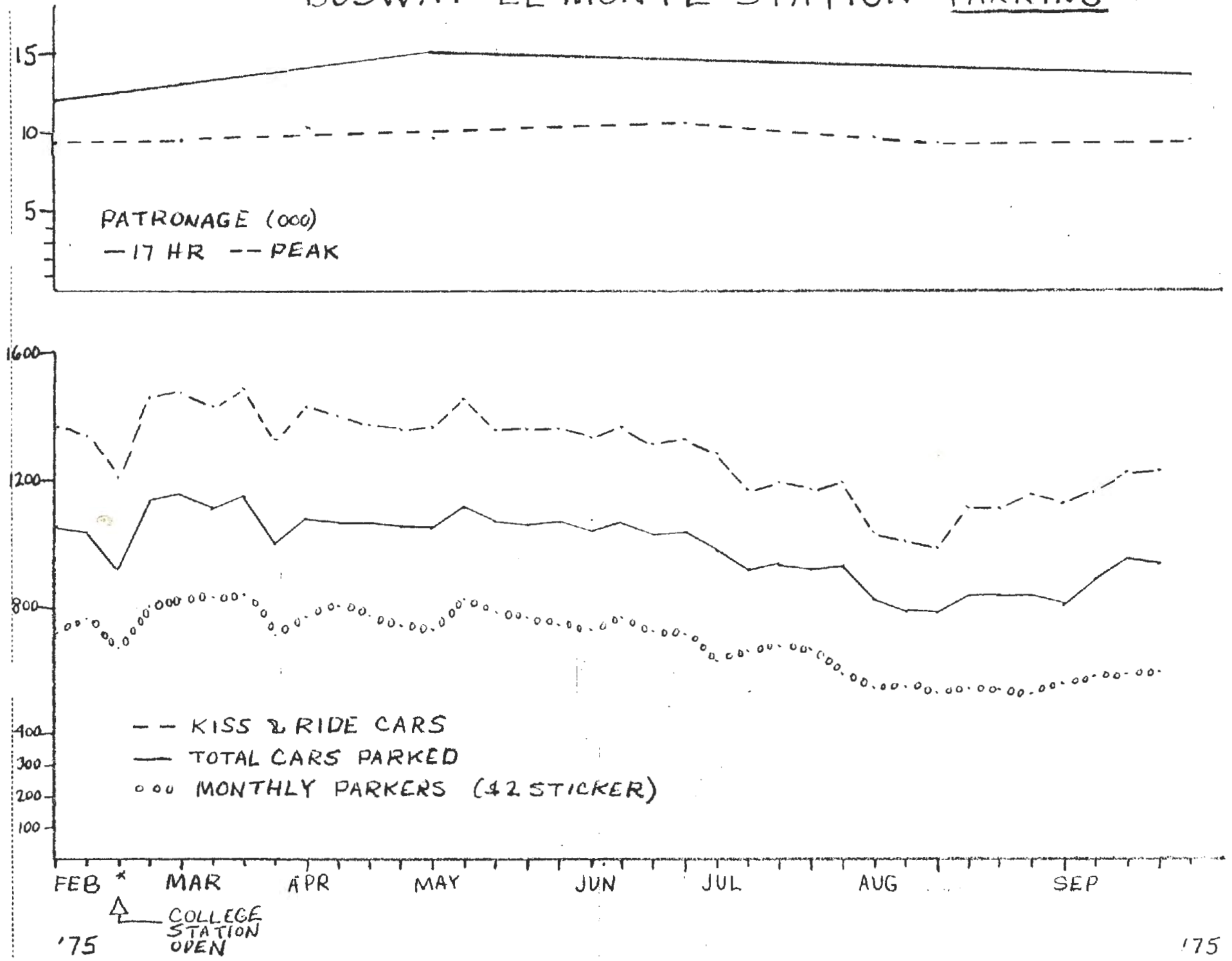
The parking figures include only those persons arriving by 10:00 a.m. With the expansion of the parking lot to 1400 spaces, some additional parking may be occurring after 10:00 a.m. Further, these figures do not account for a probable small number of cars with multiple occupancy.

# BUSWAY EL MONTE STATION PARKING




PLNG DGM 5-76

# BUSWAY EL MONTE STATION PARKING



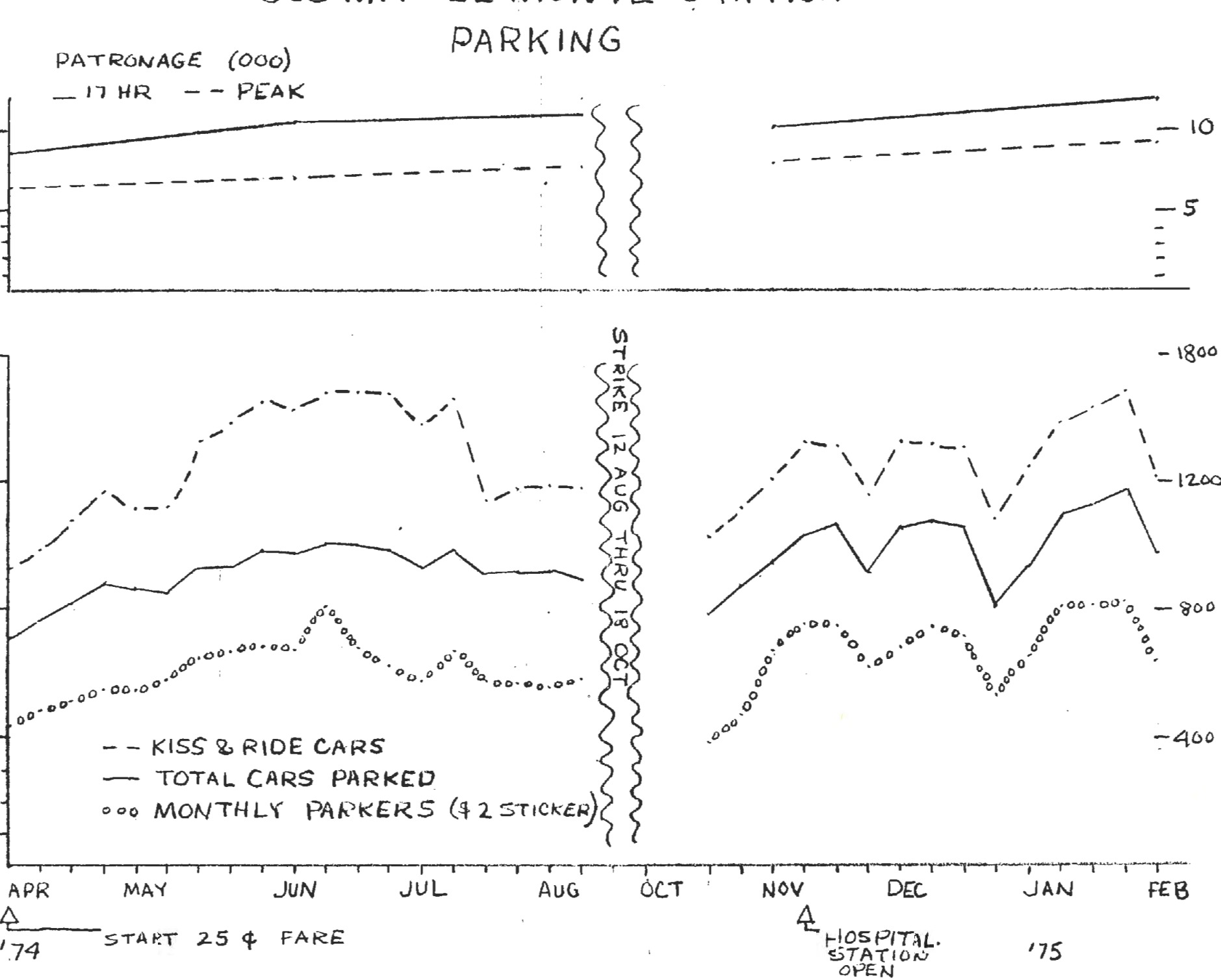

PLNG DGM 3-75

* PARTIAL WEEKDAY HOLIDAY



SHEET NO. ..... OF .....
JOB NO. .....
SUBJECT .....
BY ..... DATE .....
CHKD. BY ..... DATE .....

# BUSWAY EL MONTE STATION PARKING



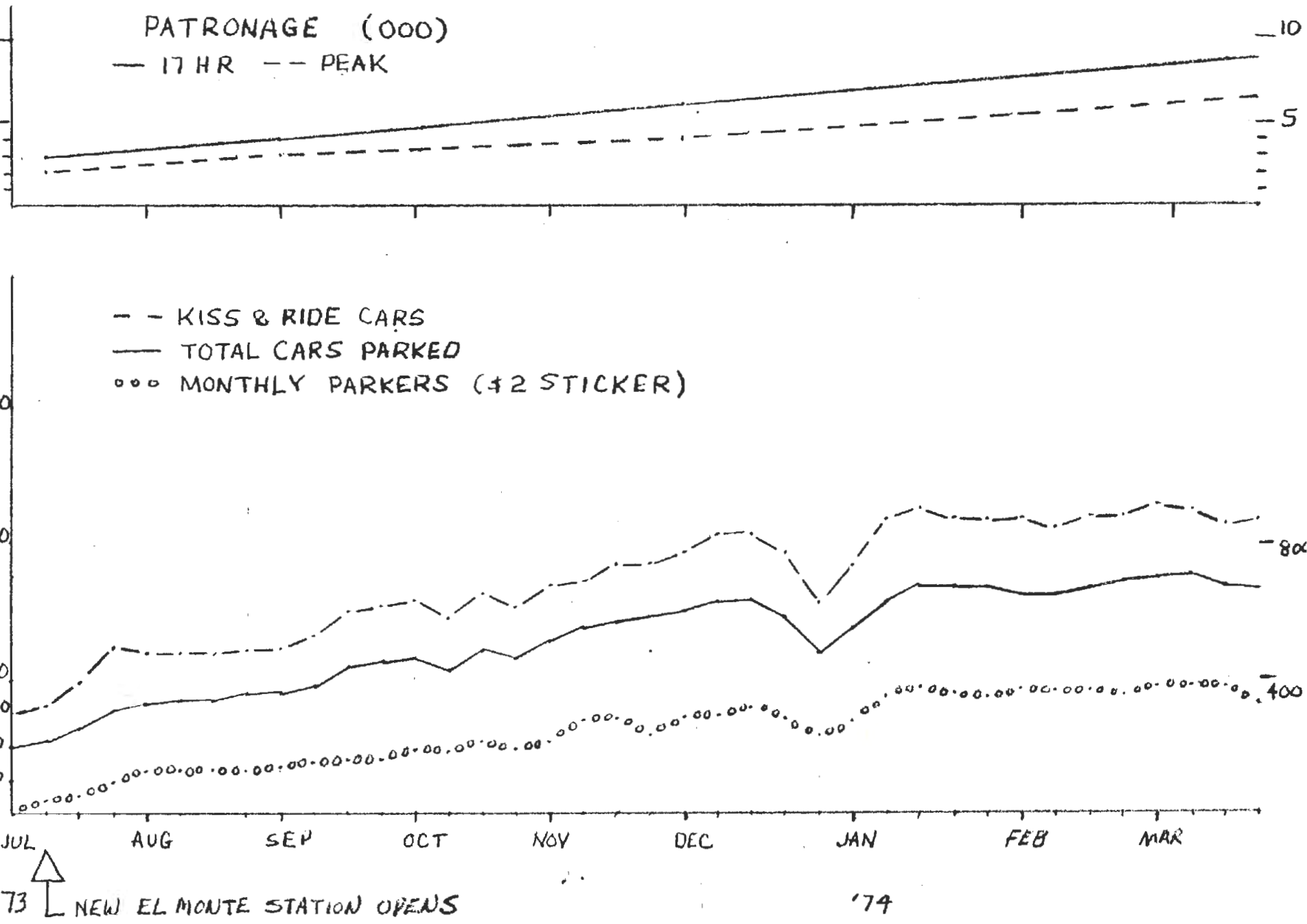

SHEET NO. ..... OF .....
JOB NO. .....
SUBJECT .....
DATE .....
BY ..... CHKD. BY ..... DATE .....

-41-

PLNG. DGM. 2-75

# BUSWAY EL MONTE STATION

## PARKING



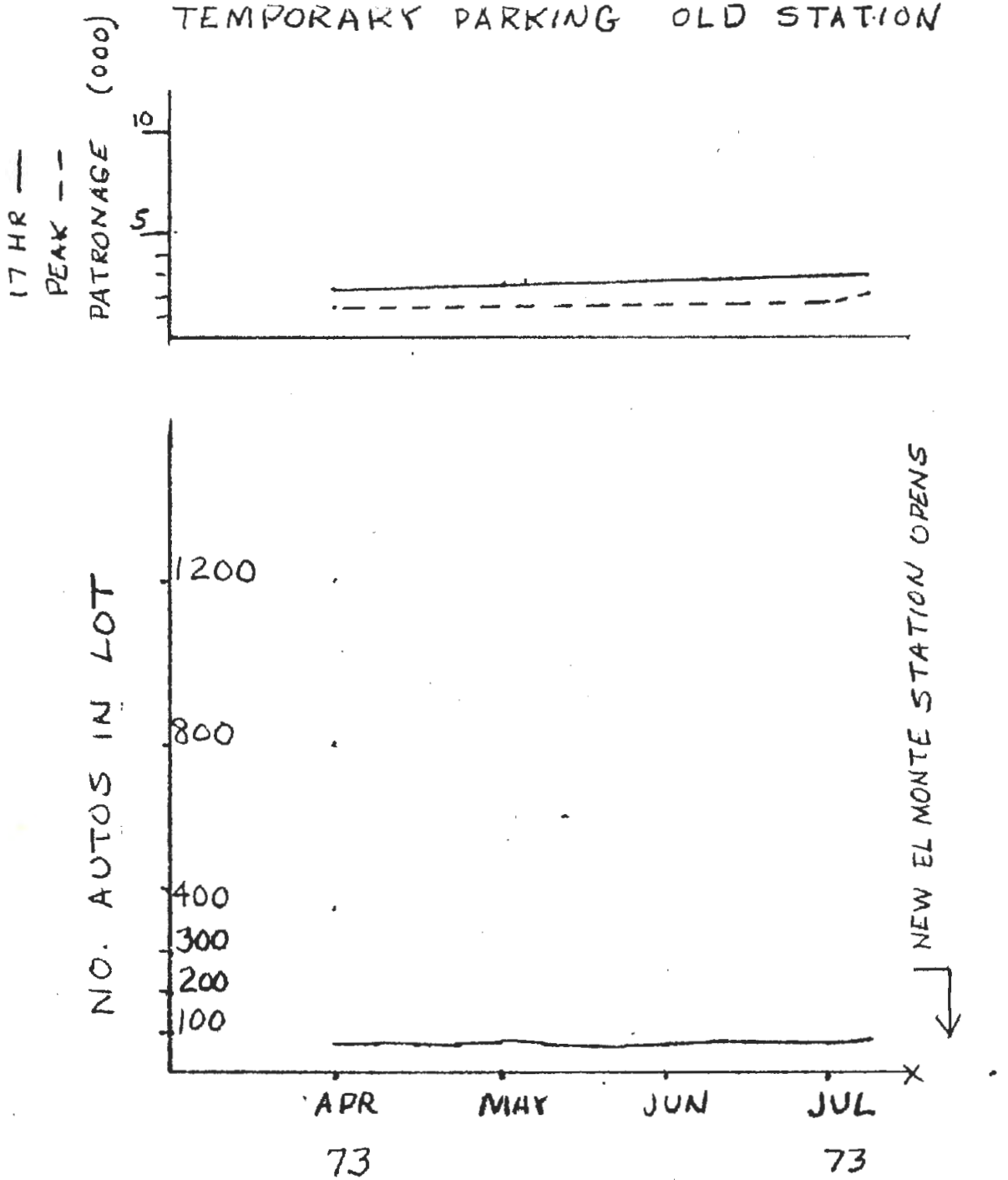

SHEET NO. ..... OF .....
JOB NO. .....
SUBJECT .....
DATE ..... DATE .....
BY ..... CHKD. BY .....



PLNG. DGM. 2-75

# BUSWAY EL MONTE STATION

## TEMPORARY PARKING OLD STATION




NOTE X = NO COUNT AVAIL WEEK OF 7-9 THRU 7-13

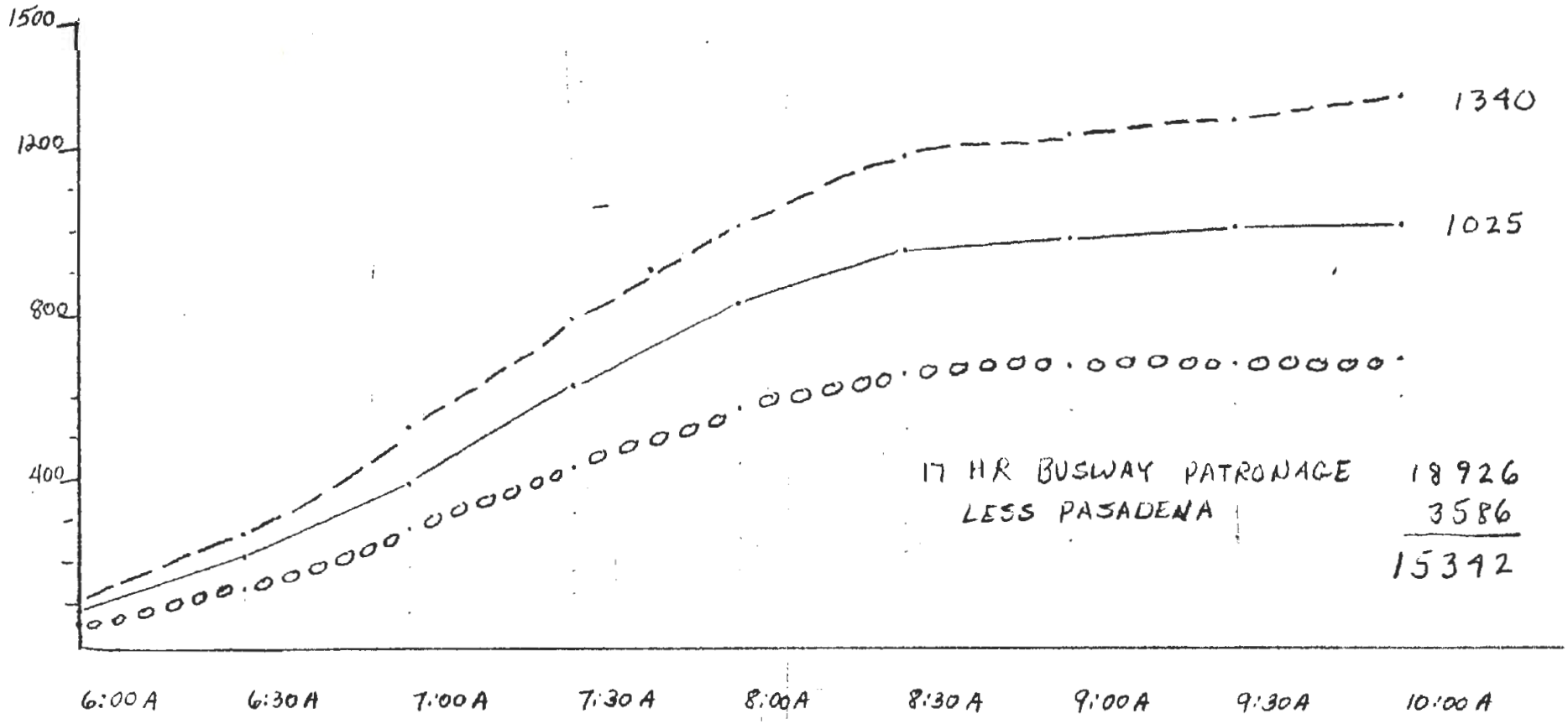
PLNG
DGM 2-75

BY..... DATE..... SUBJECT..... SHEET NO..... OF.....
CHKD. BY..... DATE..... JOB NO.....

CARS ENTERING EL MONTE PARKING LOT BY TIME
SELECTED DAYS

CUMULATIVE

-- KISS & PARK RIDE  MAY 6, 1976
— TOTAL CARS PARKED *
000 MONTHLY PARKERS
($2 STICKER)



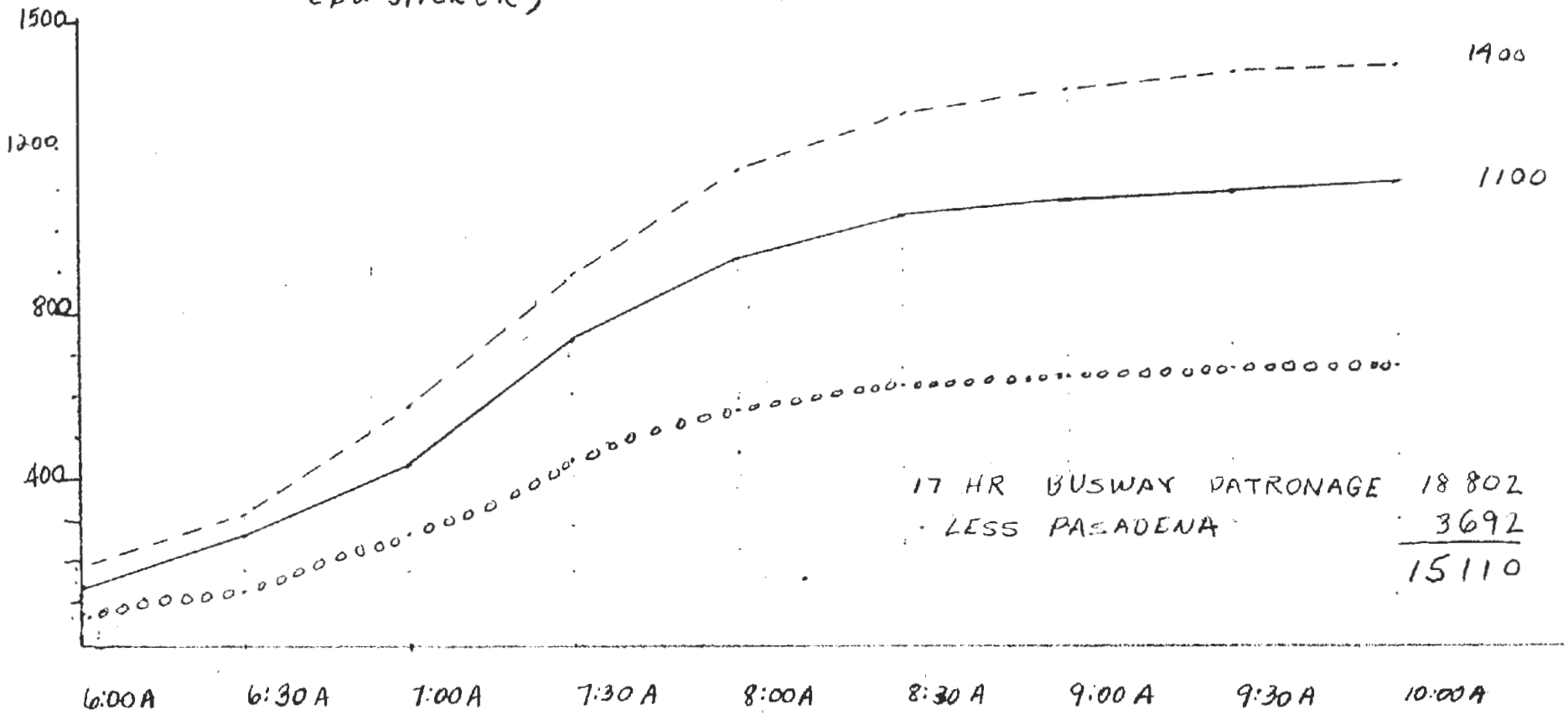

17 HR BUSWAY PATRONAGE 18926
LESS PASADENA 3586
15342

PLNG DGM 5-76  * EXCLUDES 30 CARS - POLICE OFFICERS

CARS ENTERING EL MONTE PARKING LOT BY TIME
SELECTED DAYS

CUMULATIVE APR 29, 1976

— — KISS & PARK RIDE
—— TOTAL CARS PARKED *
ooo MONTHLY PARKERS
(C&2 STICKER)




17 HR BUSWAY PATRONAGE 18802
LESS PASADENA 3692
15110



PLNG DGM 5-76

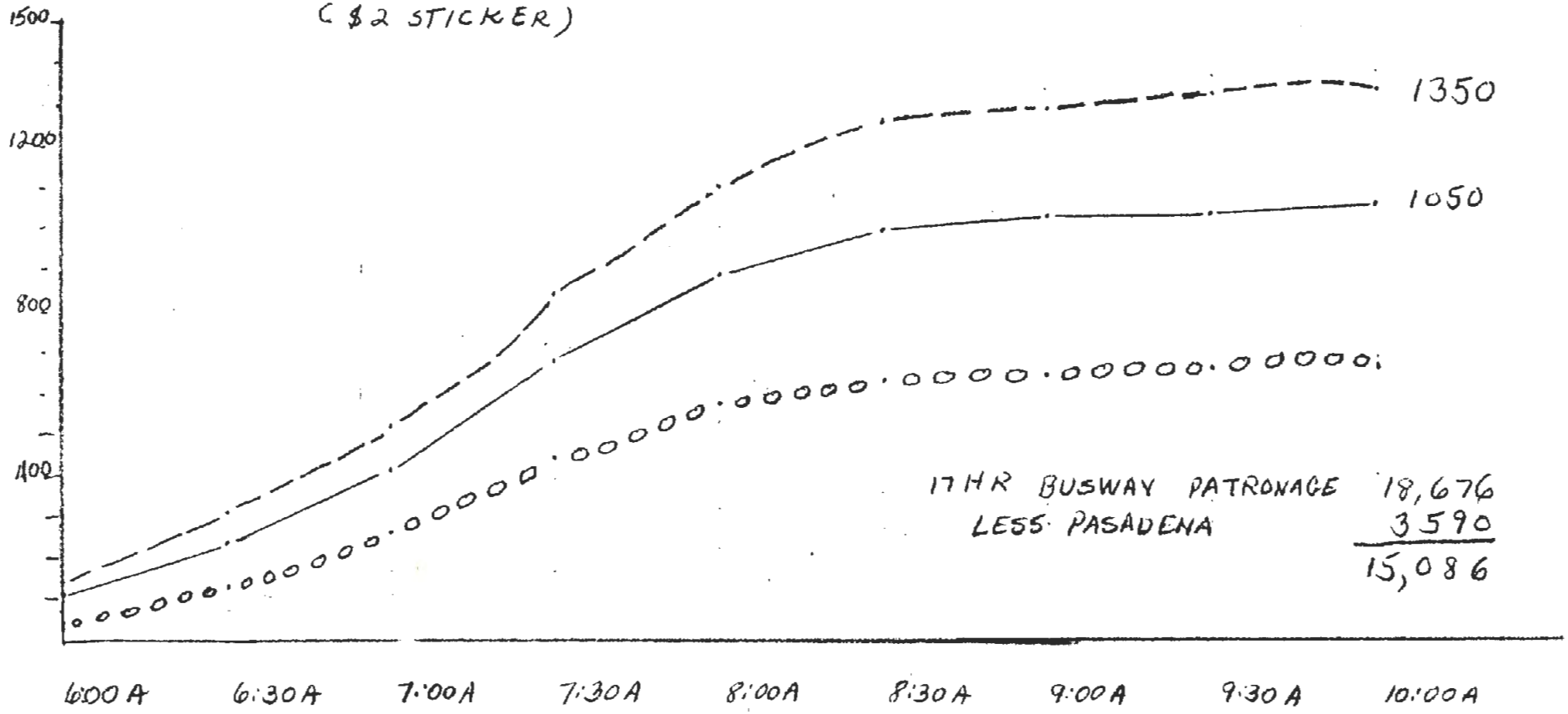
* EXCLUDES 28 CARS - POLICE OFFICERS

CARS ENTERING EL MONTE PARKING LOT BY TIME

SELECTED DAYS

CUMULATIVE ARR 22, 1976

-- KISS & PARK RIDE
— TOTAL CARS PARKED *
ooo MONTHLY PARKERS
($2 STICKER)

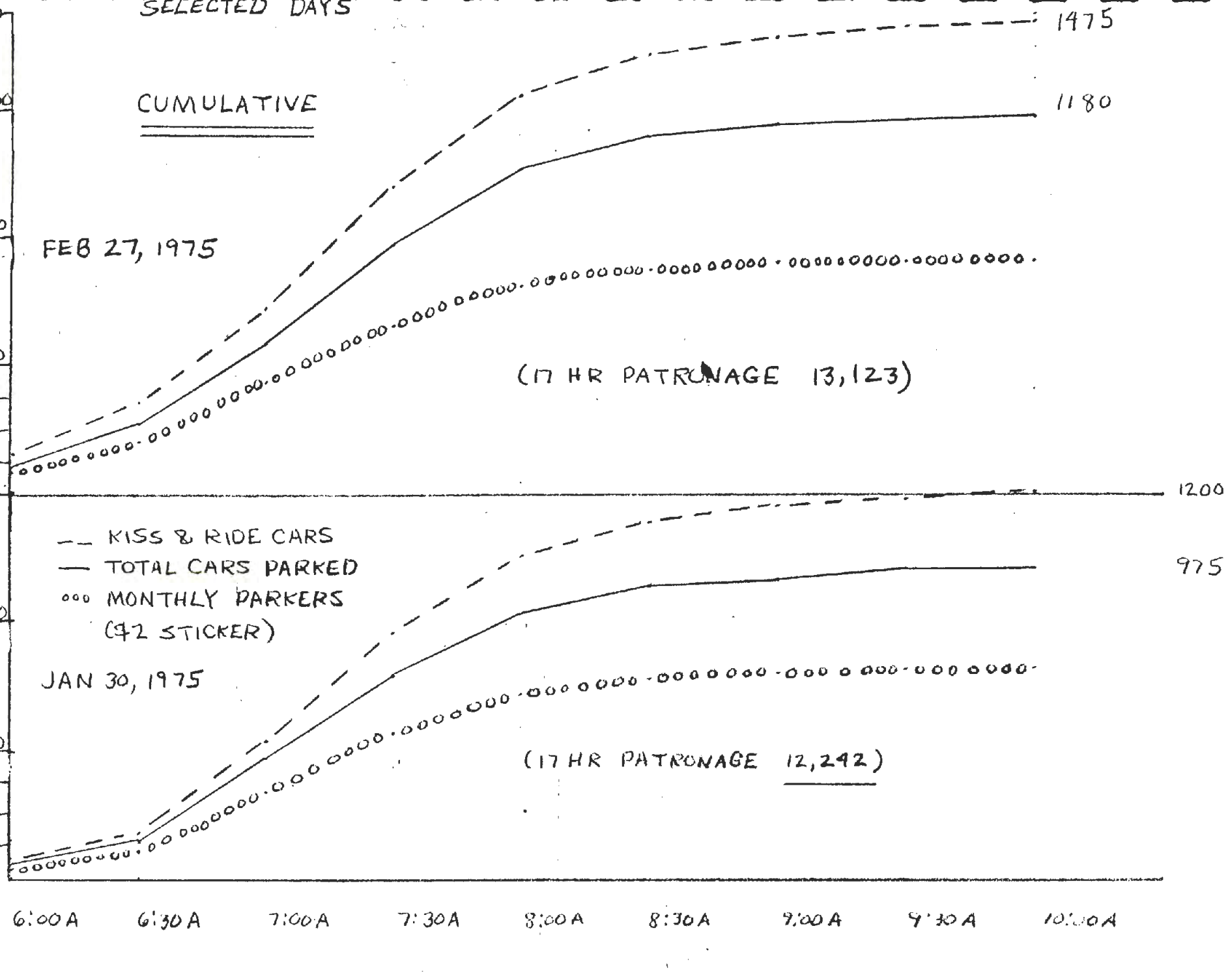



17 HR BUSWAY PATRONAGE 18,676
LESS PASADENA 3590
15,086

PLNG DGN 5-76 * EXCLUDES 32 CARS - POLICE OFFICERS

SHEET NO. ..... OF .....
JOB NO. .....
SUBJECT .....
BY ..... DATE .....
CHKD. BY ..... DATE .....

# CARS ENTERING EL MONTE PARKING LOT BY TIME
## SELECTED DAYS



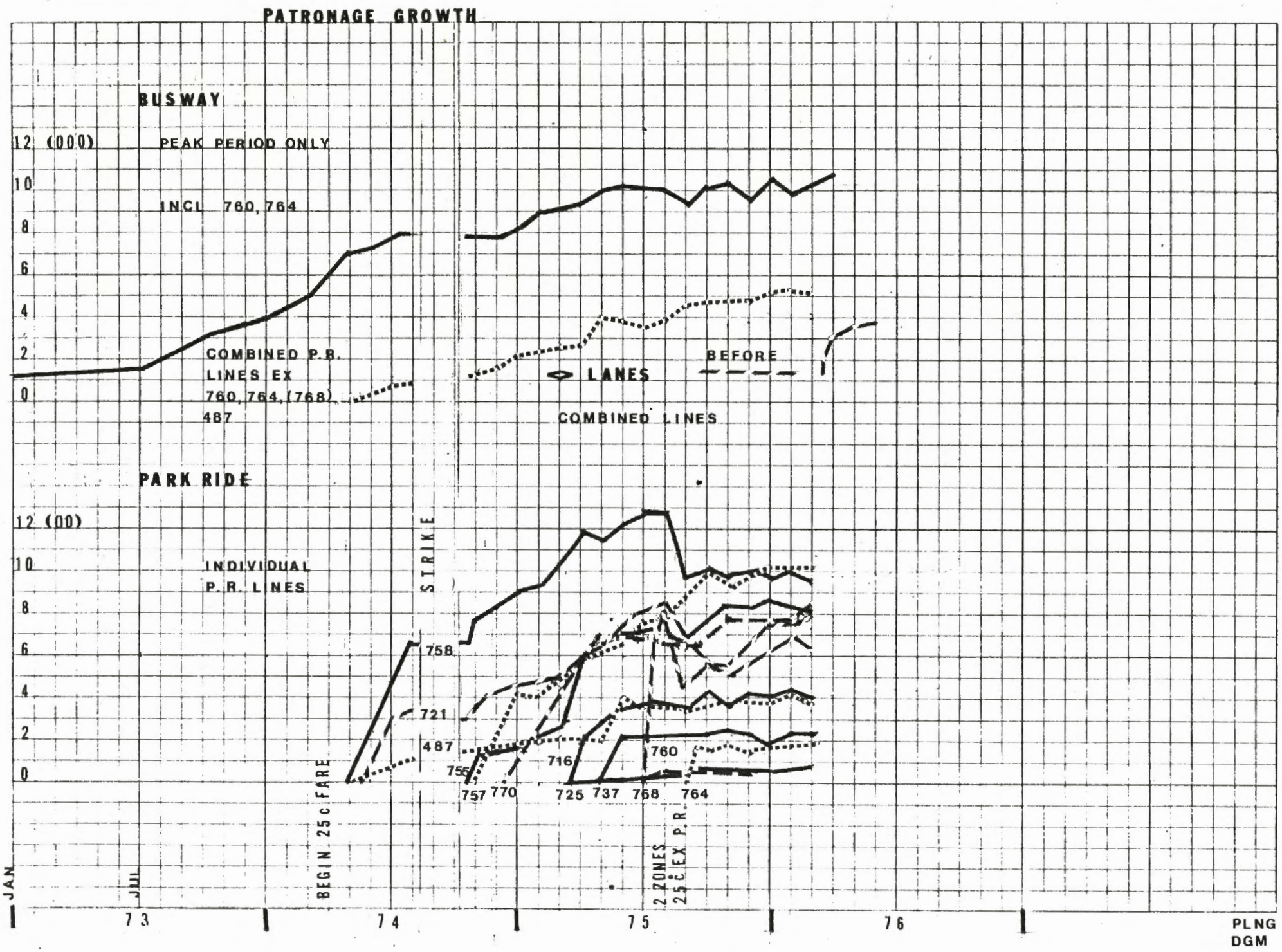

PLNG DEM 2-75

## PATRONAGE GROWTH COMPARISON

The graph shows the rate of patronage growth of the busway in comparison with the park/ride services. Of the 12 present locations, 3 are served by lines which are included in the busway system counts. (These three are 487 (formerly 53F), San Gabriel, 760 Eastland Center, and 764 Pomona.) The curve for the accumulative total of the 9 non-Busway park/ride lines shows a growth rate similar to the Busway growth. However, the curves for several of the individual park/ride lines show substantially greater initial growth rates.

Fare increases occurred in the summer of 1975, terminating the experimental county-wide 25¢ flat fare, which began April 1, 1974. The cash fare was increased in mid-July, 1975. The base fare remained 25¢, with an additional 25¢ charge for travel to a second zone. The monthly pass rate for the new 2-zone fare structure was increased August 1. One-zone monthly passes remained at $10.00 (good for unlimited number of rides), with a two-zone pass costing $18.00. On September 1, 1976, a 25¢ surcharge was applied to park/ride fares. All but two of the park/ride services were two-zone fares, thus increasing these fares to 75¢.

The most recently established preferential bus and carpool lanes, "Diamond Lanes," on the Santa Monica Freeway, are also included on the graph for comparison purposes.


PATRONAGE GROWTH
BUSWAY
12 (000)
PEAK PERIOD ONLY
10
INCL 760, 764
8
6
4
2
0
COMBINED P.R. LINES EX 760, 764, (768) 487
BEFORE
LANES
COMBINED LINES
PARK RIDE
12 (00)
INDIVIDUAL P.R. LINES
10
8
6
4
2
0
STRIKE
758
721
487
755
757
770
716
725
737
760
768
764
BEGIN 25c FARE
2 ZONES 25c EX P.R.
JAN
JUL
73
74
75
76
PLNG
DGM
5 76

## RUNNING TIME AND AVERAGE SPEED NOTES

### Running Time

Scheduled running time over the approximately 11 mile length of the busway is about 12 or 13 minutes. All busway service except park/ride (also except for subscription bus service) stop upon demand at Medical Center and University Stations to board and discharge passengers.

Due to the exclusive use of this right-of-way by buses, the running time is constant throughout the day. This compares with the usual peak to off-peak fluctuation in scheduled running times between time periods (as illustrated in the bar graph).

The busway length represents 50% and less than 20% of the total route length of individual busway routes. Due to the substantially higher speeds obtained on the busway segment, the busway running time represents an even smaller proportion of total elapsed time for each busway route.

### Average Speed

The high average speed of 50+ mph on the busway includes station stops as required for all trips (except park/ride service) to board and discharge passengers. The average scheduled speed on busway routes east of El Monte Station of 21-24 mph, excluding the non-characteristic inter-urban service of line 60, is also significantly higher than the system surface average of 12-15 mph. This is due to lower than average trip densities reflecting the lower average population densities and lower per capita ridership of this non-transit-oriented suburban sector.

The low average speed of 9-10 mph for the CBD and Wilshire Boulevard portions of the routes negates the perceived and real time savings obtained from the busway. From a travel time standpoint, the attractiveness of the busway is diminished, of course, in proportion to the length the rider travels on surface downtown streets before the bus enters the busway.

To reduce travel time and thereby make public transit more attractive, the exclusive, grade-separated, right-of-way provided by the busway is needed most in the downtown area where it is lacking. Here the buses are caught competing with other vehicular traffic, waiting for traffic signals and mid-block pedestrian crossings, and waiting while passengers board and alight. The latter delay is compounded by high platforms and narrow doors and aisles.

The experimental Spring Street contraflow lane was reported on in the previous Second Year Report. The SCRTD staff believes the Spring Street lane has proven the concept a workable one for Los Angeles. However, the data to date indicates that for this particular location (Spring Street) as currently operated, the effect in speeding up bus travel has been negligible.

The Spring Street contraflow lane started May 19, 1974. The lines routed over this new contraflow lane formerly operated on Main Street (which is the next street parallel to Spring Street on the east). Comparative average speed data varies, depending on when the data was obtained.

Available SCRTD data indicates the following comparative average bus speeds for northbound peak period travel on three immediately adjacent CBD streets:

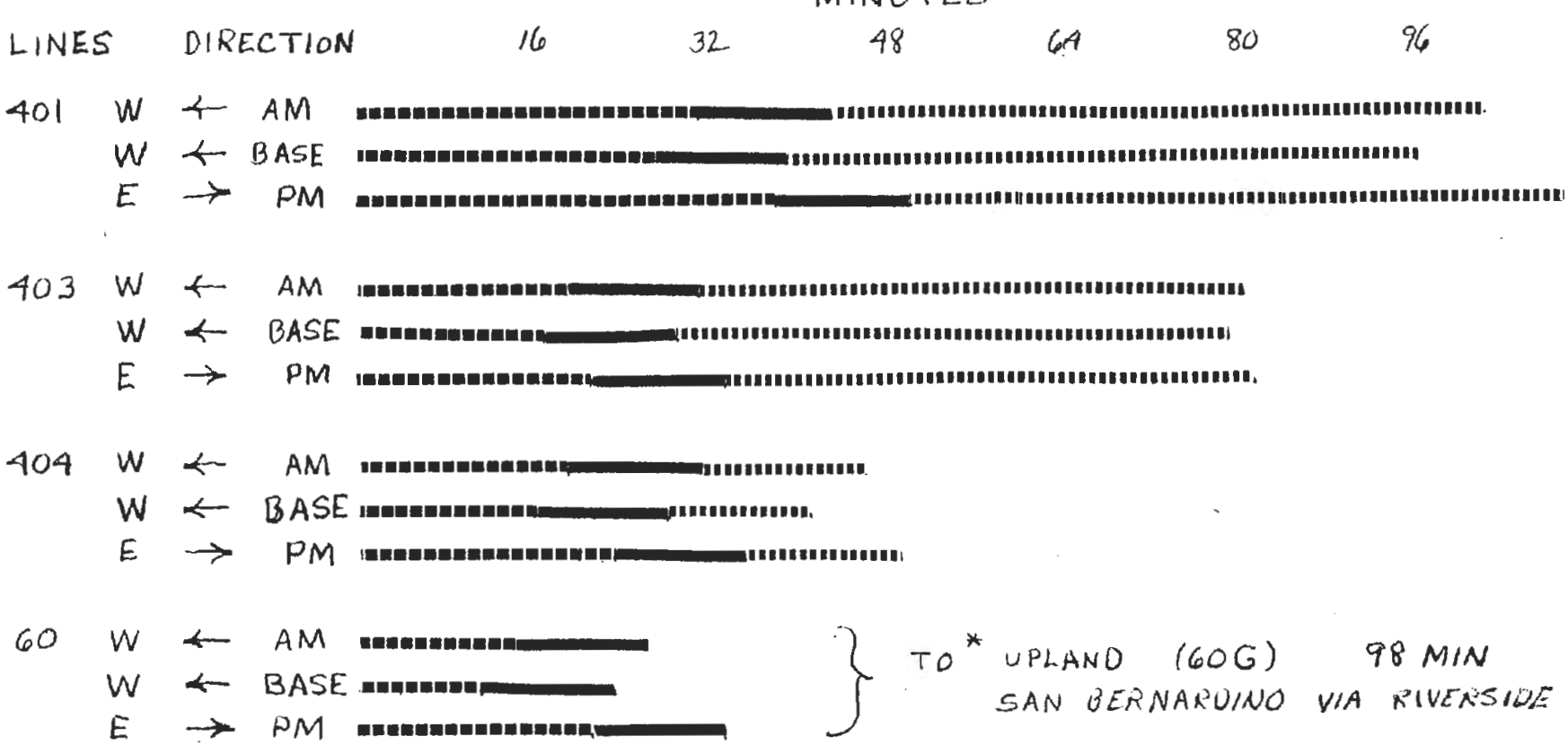
| Before Contraflow | After Contraflow | |
|---|---|---|
| Main Street (1.4 miles) | Spring Street Contraflow (1.2 miles) | Hill Street (1.2 miles) |
| 6.3 - 7.5 mph | 7.7 - 7.8 mph | 6.6 mph |

A Los Angeles City Traffic Department report of August, 1974, showed a 7.6 mph rate for the contraflow lines in a comparable period of the day.

Further investigation is needed in two areas on this subject. The effect on patron and potential patron of the increased transit visibility in operating under this mode; and, secondly, the extent and effect of perceived time savings and service reliability in operation of buses on a surface street in a lane free of other vehicular traffic.

# SCHEDULED RUNNING TIME COMPARISON

## SURFACE VS BUSWAY SEGMENTS OF SELECTED BUSWAY ROUTES




* BASED ON EASTBOUND PM RUNNING TIME

LEGEND

RUNNING TIME SEGMENTS

- ▪▪▪▪▪▪▪▪ LA CBD & WILSHIRE
- ▬▬▬▬ BUSWAY
- ▪▪▪▪▪▪▪▪▪▪ EAST OF EL MONTE STATION

DATA FOR WEEKDAY SERVICE ONLY

PLNG
DGM 5-76

AVERAGE SCHEDULED SPEED COMPARISON
SURFACE VS. BUSWAY SEGMENTS
OF SELECTED BUSWAY ROUTES*

| LINE | FACTOR | LA CBD & WILSHIRE | BUSWAY | EAST OF EL MONTE STATION | TOTAL |
|---|---|---|---|---|---|
| 401 | Distance | 6.15 mi. | 10.5 mi. | 23.75 mi. | 40.40 mi. |
| | Time | 38 min. | 12 min. | 59 min. | 109 min. |
| | Av. Speed | 9.76 mph | 52.50 mph | 24.23 mph | 22.20 mph |
| 403 | Distance | 3.52 mi. | same | 17.98 mi. | 32.00 mi. |
| | Time | 23 min. | as | 50 min. | 85 min. |
| | Av. Speed | 9.26 mph | above | 21.66 mph | 22.53 mph |
| 404 | Distance | same | same | 5.18 mi. | 19.20 mi. |
| | Time | as | as | 14 min. | 49 min. |
| | Av. Speed | above | above | 22.52 mph | 23.41 mph |
| 60 | Distance | 2.59 mi. | same | ** | ** |
| | Time | 21 min. | as | | |
| | Av. Speed | 7.40 mph | above | | |

* Data for weekday service only.

**Data for 60F to San Bernardino via Riverside and data for 60G to Upland and 60E non-stop to Riverside & San Bernardino not shown.

## BUSWAY LINES OPERATING DATA

Operating data for the six busway lines serving the El Monte Station are included herein. Not shown are the three peak-period-only bus routes which use the Del Mar Boulevard bus ramp. Since these three routes operate as branches of parallel surface routes, the line statistics include both surface and busway trips and, as such, are not useful in a description of busway service. Also not shown are the two park/ride lines which operate through the busway.

The cost, patronage, and mileage data for 1975 is the same data used for the necessary calculations in the Second Year Report.

As noted elsewhere, the discontinued status of each of the lines refers to the replacement of these lines by new lines as a part of the San Gabriel Valley area-wide service expansion, effective April 11, 1976.

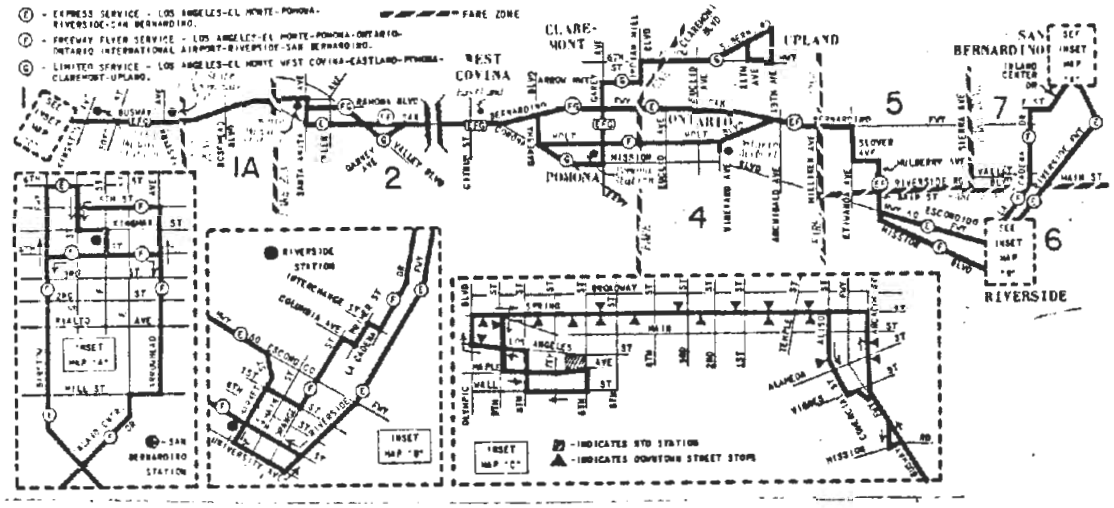
Separately shown are the bus requirements for peak and midday service, weekday, Saturday and Sunday. Although all data included in this report and in Appendix A refers to weekday service only, data for Saturday and Sunday is included to indicate service levels on these days.

Lastly, in this section, a detailed line profile of boarding and alighting and other operational information is included for line 401. (This detailed patronage report has not been published for the other busway lines.) The patronage graphs illustrate the boarding and alighting pattern for the portions of the route east of El Monte Station, as well as the CBD portion.

## LINE SUMMARY

CANCELLED 4/11/76
Alternate service on Lines 445 - 451 - 453 480 -482 - 484 - 486 - 496.

LINE 60E LOS ANGELES SUPER "FLYER" - EXPRESS
LINE 60F INLAND EMPIRE FREEWAY "FLYER"
LINE 60G LIMITED




*Map Effective 11/16/75*

## COST FACTORS

Data for the month of December, 1975.

| | Weekday | Sat. | Sun. | Annual Base |
|---|---|---|---|---|
| No. buses | 33 | 12 | 12 | - |
| Bus miles | 8,060 | 5,220 | 5,150 | 2,625,400 |
| Driver hours | 459 | 286 | 298 | 149,100 |
| Full cost | $9,290 | $5,870 | $6,010 | $3,023,000 |

Data for the month of August, 1975.

| | | | | |
|---|---|---|---|---|
| No. buses | 33 | 12 | 12 | - |
| Bus miles | 7,920 | 5,040 | 5,180 | 2,581,900 |
| Driver hours | 439 | 282 | 291 | 143,600 |
| Full cost | $8,750 | $5,610 | $5,770 | $2,857,000 |

LINE 60
Cancelled 4/11/76

RIDERSHIP

| Day of check | riders | cash riders | cash | estim. revenue |
|---|---|---|---|---|
| Wed. 3 Sept. 1975 | 6,510 | 2,230 | $965 | $2,160 |
| Tues. 9 Dec. 1975 | 6,310 | 5,210 | $1,110 | $1,330 |

PRODUCTIVITY SUMMARY

| | riders mile | riders bus hr | riders driv hr | cost rider | est rev rider |
|---|---|---|---|---|---|
| Wed. 3 Sept. 1975 | 0.82 | 19.7 | 14.8 | $1.34 | 33.2¢ |
| Tues. 9 Dec. 1975 | 0.78 | 19.1 | 13.7 | $1.47 | 21.1¢ |

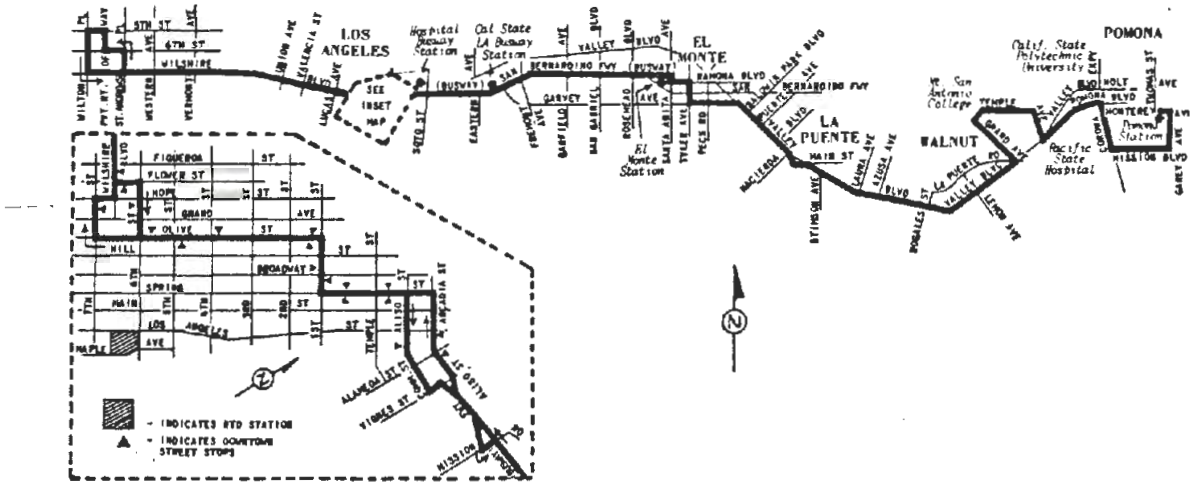
SERVICE ANALYSIS SECTION
SOUTHERN CALIFORNIA
RAPID TRANSIT DISTRICT

9 OCTOBER 1975
17 MARCH 1976 (R)

# LINE SUMMARY

CANCELLED 4/11/76
Alternate service on
Lines 480 - 484 - 486.

## LINE 401 LOS ANGELES - POMONA




*Map Effective 7/20/75*

## COST FACTORS

Data for the month of October, 1975.

| | Weekday | Sat. | Sun. | Annual Base |
|---|---|---|---|---|
| No. buses | 21 | 6 | 4 | - |
| Bus miles | 4,220 | 2,240 | 1,580 | 1,283,200 |
| Driver hours | 267 | 115 | 86 | 79,200 |
| Full cost | $4,950 | $2,260 | $1,680 | $1,476,700 |

Data for the month of March, 1975.

| | | | | |
|---|---|---|---|---|
| No. buses | 20 | 6 | 4 | - |
| Bus miles | 3,930 | 2,230 | 1,580 | 1,209,900 |
| Driver hours | 246 | 116 | 87 | 74,000 |
| Full cost | $4,060 | $2,000 | $1,480 | $1,256,000 |

## RIDERSHIP

| Day of check | | riders | cash riders | cash | estim. revenue |
|---|---|---|---|---|---|
| Thurs. | 13 March 1975 | 4,340 | 1,820 | $505 | $930 |
| Sun. | 30 March 1975 | 1,210 | -- | -- | -- |
| Sat. | 10 May 1975 | 1,780 | 960 | $258 | $310 |
| Wed. | 15 Oct. 1975 | 5,260 | 2,260 | $799 | $1,070 |

## PRODUCTIVITY SUMMARY

| | | riders / mile | riders / bus hr | riders / driv hr | cost / rider | est rev / rider |
|---|---|---|---|---|---|---|
| Thurs. | 13 March 1975 | 1.10 | 22.7 | 18.0 | 94¢ | 21.4¢ |
| Sun. | 30 March 1975 | .77 | 15.5 | 14.0 | $1.22 | -- |
| Sat. | 10 May 1975 | 0.80 | 17.1 | 15.3 | $1.12 | 17.7¢ |
| Wed. | 15 Oct. 1975 | 1.25 | 27.5 | 19.7 | 94¢ | 20.4¢ |

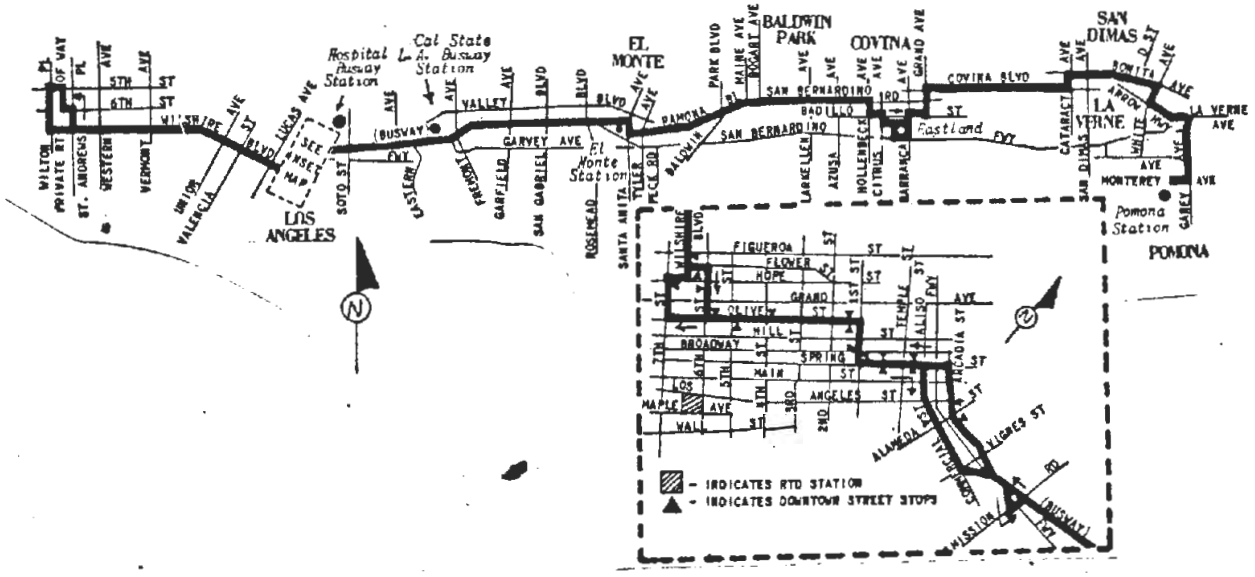
NOTE: On Sundays, all service on line 402 is operated by and charged to line 401. On an in-service mileage basis, 48.7% of the mileage is line 401 service and 51.3% is line 402.

SERVICE ANALYSIS SECTION
SOUTHERN CALIFORNIA
RAPID TRANSIT DISTRICT
29 APRIL 1975
19 AUGUST 1975 (R)
4 FEBRUARY 1976 (R)
10 FEBRUARY 1976 (R)

# LINE SUMMARY

## LINE 402 LOS ANGELES - EL MONTE - POMONA VIA COVINA

CANCELLED 4/11/76
Alternate service on Lines 443, 455, 449, 451, and 490.




## COST FACTORS

Data for the month of January, 1976.

| | Weekday | Sat. | Sun. | Annual Base |
|---|---|---|---|---|
| No. buses | 20 | 7 | - | - |
| Bus miles | 3,780 | 1,980 | - | 1,066,800 |
| Driver hours | 252 | 113 | - | 70,100 |
| Full cost | $4,890 | $2,290 | - | $1,367,000 |

Data for the month of March, 1975.

| | | | | |
|---|---|---|---|---|
| No. buses | 18 | 7 | - | - |
| Bus miles | 3,530 | 1,990 | - | 1,003,300 |
| Driver hours | 225 | 115 | - | 63,350 |
| Full cost | $3,690 | $1,920 | - | $1,042,000 |

## RIDERSHIP

| Day of check | riders | cash riders | cash | estim. revenue |
|---|---|---|---|---|
| Tuesday 18 March 1975 | 4,520 | 2,190 | $529 | $930 |
| Wednesday 15 Oct. 1975 | 5,120 | 2,340 | $780 | $1,060 |
| Saturday 10 Jan. 1976 | 1,900 | 1,150 | $350 | $420 |

## PRODUCTIVITY SUMMARY

| | riders / mile | riders / bus hr | riders / driv hr | cost / rider | est rev / rider |
|---|---|---|---|---|---|
| Tuesday 18 March 1975 | 1.28 | 26.4 | 20.1 | 82¢ | 20.0¢ |
| Wednesday 15 Oct. 1975 | 1.34 | 28.3 | 20.8 | 91¢ | 20.8¢ |
| Saturday 10 Jan. 1976 | 0.96 | 18.5 | 16.8 | $1.21 | 22¢ |

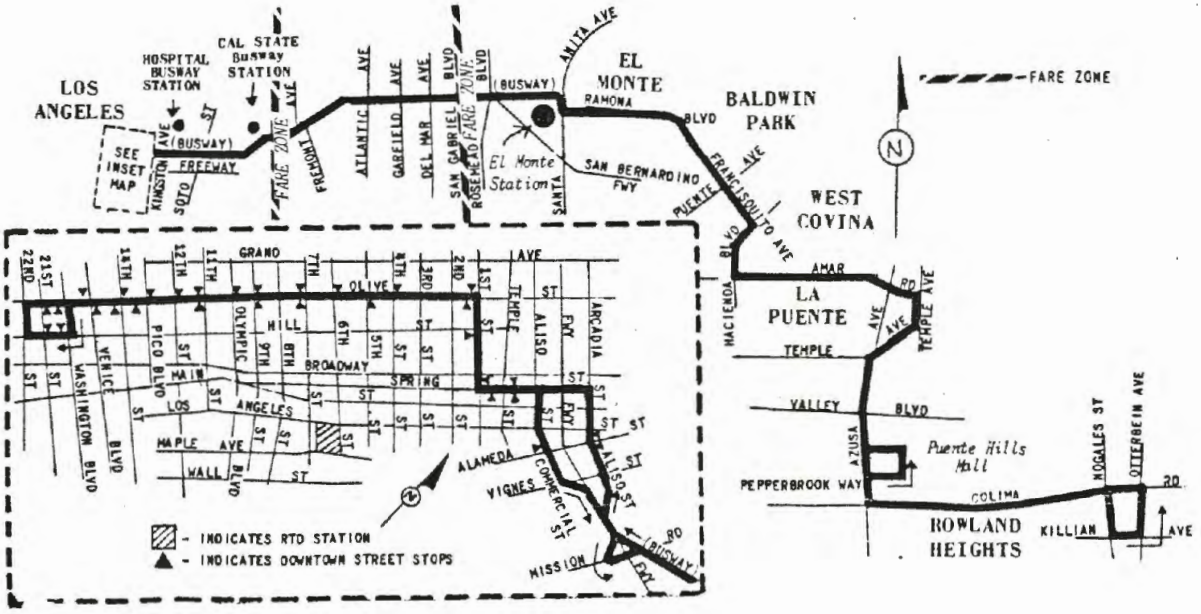
SERVICE ANALYSIS SECTION
SOUTHERN CALIFORNIA
RAPID TRANSIT DISTRICT

24 JUNE 1975
30 MARCH 1976 (R)
20 MAY 1976 (R)

# LINE SUMMARY

CANCELLED 4/11/76
Alternate service on Lines 486 - 488.

## LINE 403 LOS ANGELES - LA PUENTE - PUENTE HILLS MALL - ROWLAND HEIGHTS




*Map Effective 8/3/75*

## COST FACTORS

Data for the month of October, 1975.

| | Weekday | Sat. | Sun. | Annual Base |
|---|---|---|---|---|
| No. buses | 15 | 4 | - | - |
| Bus miles | 2,410 | 1,110 | - | 673,400 |
| Driver hours | 169 | 71 | - | 46,900 |
| Full cost | $3,060 | $1,310 | - | $847,800 |

Data for the month of February, 1975.

| | | | | |
|---|---|---|---|---|
| No. buses | 13 | 4 | - | - |
| Bus miles | 2,410 | 1,110 | - | 671,400 |
| Driver hours | 154 | 70 | - | 42,800 |
| Full cost | $2,520 | $1,150 | - | $703,300 |

Cancelled

## RIDERSHIP

| Day of check | riders | cash riders | cash | estim. revenue |
|---|---|---|---|---|
| Wed. 26 Feb. 1975 | 2,690 | 1,400 | $346 | $530 |
| Sat. 19 July 1975 | 1,650 | 1,240 | $329 | $380 |
| Thurs. 2 Oct. 1975 | 3,350 | 1,749 | $566 | $700 |
| Sat. 18 Oct. 1975 | 1,900 | 1,450 | $386 | $420 |

## PRODUCTIVITY SUMMARY

| | riders / mile | riders / bus hr | riders / driv hr | cost / rider | est rev / rider |
|---|---|---|---|---|---|
| Wed. 26 Feb. 1975 | 1.12 | 24.8 | 24.4 | 94¢ | 19./¢ |
| Sat. 19 July 1975 | 1.48 | 24.9 | 23.4 | 70¢ | 23.3¢ |
| Thurs. 2 Oct. 1975 | 1.39 | 27.5 | 19.8 | 91¢ | 21.0¢ |
| Sat. 18 Oct. 1975 | 1.71 | 28.6 | 26.7 | 69¢ | 22.1¢ |

SERVICE ANALYSIS SECTION
SOUTHERN CALIFORNIA
RAPID TRANSIT DISTRICT

4 JUNE 1975

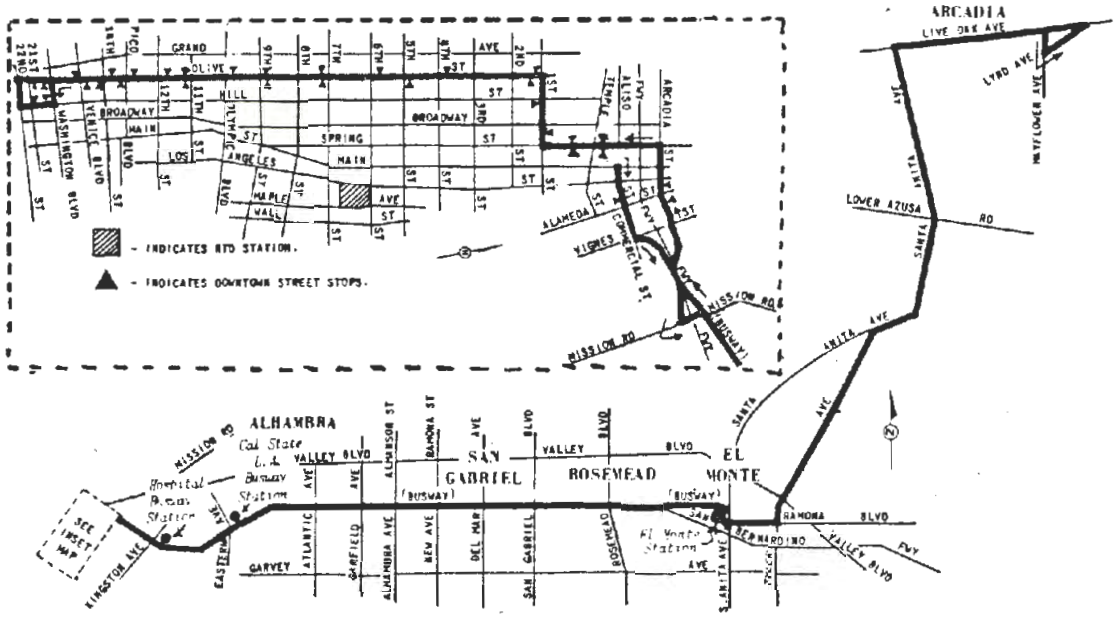
2 JULY 1975 (R)

12 AUGUST 1975 (R)
2 FEBRUARY 1976 (R)
10 FEBRUARY 1976 (R)

# LINE SUMMARY

CANCELLED 4/11/76
Alternate service on Lines 428-491-492.

## LINE 404 LOS ANGELES - EL MONTE - SOUTH ARCADIA




*Map Effective 5/4/75*

## COST FACTORS

Data for the month of October, 1975.

| | Weekday | Sat. | Sun. | Annual Base |
|---|---|---|---|---|
| No. buses | 10 | 2 | - | - |
| Bus miles | 1,350 | 280 | - | 358,000 |
| Driver hours | 94 | 32 | - | 25,700 |
| Full cost | $1,700 | $520 | - | $460,700 |

Data for the month of March, 1975.

| | | | | |
|---|---|---|---|---|
| No. buses | 9 | 2 | - | - |
| Bus miles | 1,280 | 290 | - | 340,400 |
| Driver hours | 86 | 33 | - | 23,700 |
| Full cost | $1,410 | $480 | - | $383,300 |

## RIDERSHIP

| Day of check | riders | cash riders | cash | estim. revenue |
|---|---|---|---|---|
| Wed. 2 April 1975 | 1,600 | 1,390 | $145 | $290 |
| Tues. 14 Oct. 1975 | 1,450 | 510 | $192 | $290 |

## PRODUCTIVITY SUMMARY

| | riders / mile | riders / bus hr | riders / driv hr | cost / rider | est rev / rider |
|---|---|---|---|---|---|
| Wed. 2 April 1975 | 1.25 | 23.7 | 18.5 | 88¢ | 18.1¢ |
| Tues. 14 Oct. 1975 | 1.08 | 20.9 | 15.4 | $1.17 | 19.8¢ |

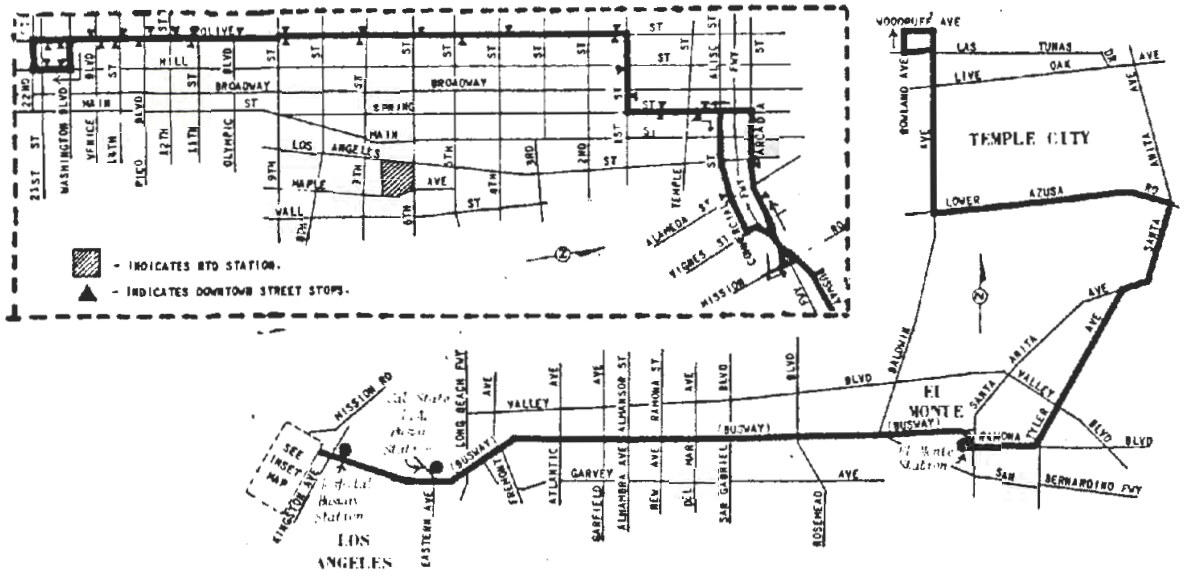
SERVICE ANALYSIS SECTION
SOUTHERN CALIFORNIA
RAPID TRANSIT DISTRICT

4 JUNE 1975
2 JULY 1975 (R)
4 FEBRUARY 1976 (R)
10 FEBRUARY 1976 (R)

# LINE SUMMARY

CANCELLED 4/11/76
Alternate service
on Line 435.

## LINE 405 LOS ANGELES - EL MONTE - TEMPLE CITY




*Map Effective 5/4/75*

## COST FACTORS

Data for the month of October, 1975.

| | Weekday | Sat. | Sun. | Annual Base |
|---|---|---|---|---|
| No. buses | 8 | 2 | - | - |
| Bus miles | 960 | 300 | - | 259,800 |
| Driver hours | 85 | 33 | - | 23,200 |
| Full cost | $1,450 | $540 | - | $397,900 |

Data for the month of March, 1975.

| | | | | |
|---|---|---|---|---|
| No. buses | 8 | 2 | - | - |
| Bus miles | 960 | 300 | - | 259,800 |
| Driver hours | 85 | 33 | - | 23,300 |
| Full cost | $1,300 | $490 | - | $357,900 |

LINE 405
Cancelled 4/11/76

## RIDERSHIP

| Day of check | riders | cash riders | cash | estim. revenue |
|---|---|---|---|---|
| Wed. 2 April 1975 | 1,030 | 340 | $142 | $240 |
| Tues. 14 Oct. 1975 | 990 | 360 | $145 | $200 |

## PRODUCTIVITY SUMMARY

| | riders / mile | riders / bus hr | riders / driv hr | cost / rider | est rev / rider |
|---|---|---|---|---|---|
| Wed. 2 April 1975 | 1.08 | 17.7 | 12.2 | $1.26 | 23.3¢ |
| Tues. 14 Oct. 1975 | 1.03 | 16.8 | 11.7 | $1.46 | 20.3¢ |

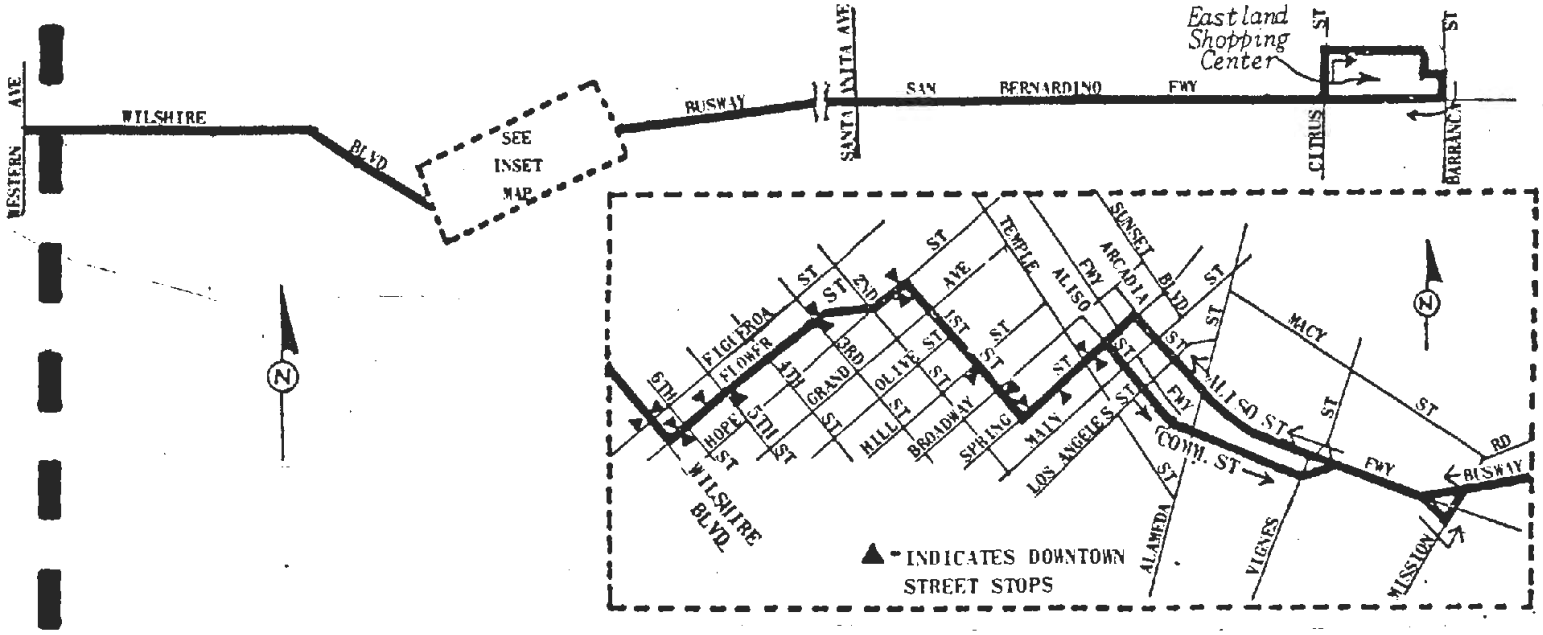
SERVICE ANALYSIS SECTION
SOUTHERN CALIFORNIA
RAPID TRANSIT DISTRICT

4 JUNE 1975

2 JULY 1975 (R)
4 FEBRUARY 1976 (R)
10 FEBRUARY 1976 (R)

# LINE SUMMARY

## LINE 760 WEST COVINA (EASTLAND PARK AND RIDE)




*Map Effective 8/18/75*

## COST FACTORS

Data for the month of September, 1975.

| | Weekday | Sat. | Sun. | Annual Base |
|---|---|---|---|---|
| No. buses | 7 | - | - | - |
| Bus miles | 790 | - | - | 201,500 |
| Driver hours | 66 | - | - | 16,800 |
| Full cost | $1,140 | - | - | $291,700 |

## RIDERSHIP

| Day of check | riders | cash riders | cash | estim. revenue |
|---|---|---|---|---|
| September, 1975 | 450 | N/A | N/A | $300 |
| January, 1976 | 720 | N/A | N/A | $490 |

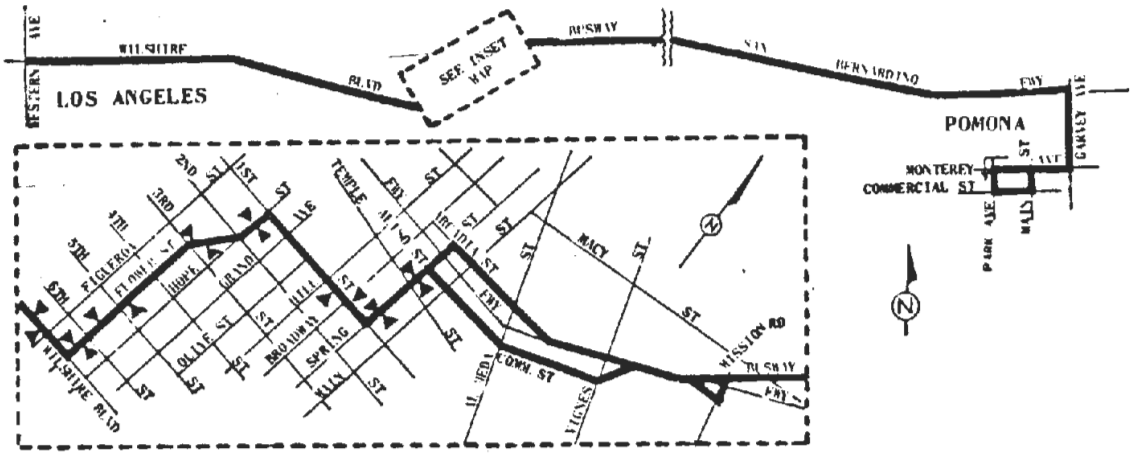
## PRODUCTIVITY SUMMARY

| | riders / mile | riders / bus hr | riders / driv hr | cost / rider | est rev / rider |
|---|---|---|---|---|---|
| September, 1975 | 0.57 | 18.2 | 6.9 | $2.52 | 66.7¢ |
| January, 1976 | 0.91 | 28.9 | 11.0 | $1.68 | 68.3¢ |

SERVICE ANALYSIS SECTION
SOUTHERN CALIFORNIA
RAPID TRANSIT DISTRICT
11 MARCH 1976

LINE SUMMARY

# LINE 764 · POMONA (PARK AND RIDE)




*Map Effective 9/1/75*

## COST FACTORS

Data for the month of September, 1975.

| | Weekday | Sat. | Sun. | Annual Base |
|---|---|---|---|---|
| No. buses | 4 | - | - | - |
| Bus miles | 470 | - | - | 120,400 |
| Driver hours | 34 | - | - | 8,800 |
| Full cost | $620 | - | - | $156,800 |

NOTE: Service established 9/2/75.

## RIDERSHIP

| Day of check | riders | cash riders | cash | estim. revenue |
|---|---|---|---|---|
| September, 1975 | 160 | N/A | N/A | $110 |
| January, 1976 | 180 | N/A | N/A | $130 |

## PRODUCTIVITY SUMMARY

| | riders / mile | riders / bus hr | riders / driv hr | cost / rider | est rev / rider |
|---|---|---|---|---|---|
| September, 1975 | 0.33 | 10.5 | 4.6 | $3.89 | 66.5¢ |
| January, 1976 | 0.39 | 12.3 | 5.4 | $3.55 | 68.5¢ |

SERVICE ANALYSIS SECTION
SOUTHERN CALIFORNIA
RAPID TRANSIT DISTRICT
11 MARCH 1976

BUSWAY LINES

(For Service in Effect Jan-Mar, 1976)

WEEKDAY

| Lines | EQUIPMENT | | | | HEADWAYS | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | WESTBOUND | | | | EASTBOUND | | | |
| | AM Peak | Base | PM Peak | Night | AM Peak | Base | PM Peak | Night | AM Peak | Base | PM Peak | Night |
| 60[a] | 31 | 15 | 33 | 6 | 6 | 20 | 12 | 60 | 15 | 20 | 8 | 60 |
| 401 | 21 | 7 | 19 | 2 | 5 | 30[b] | 30[b] | 120 | 30[b] | 30[b] | 6 | 120 |
| 402 | 20 | 7 | 19 | 2 | 6 | 30[c] | 30[c] | 90 | 30[c] | 30[c] | 6 | 90 |
| 403 | 15 | 4 | 14 | 2 | 7 | 30[d] | 30[d] | 30[e] | 30[d] | 30[d] | 7 | 30[e] |
| 404 | 8 | 4 | 10 | 0 | 15 | 30 | 20 | 30[e] | 15 | 30 | 12 | 30[e] |
| 405 | 8 | 2 | 8 | 0 | 15 | 30[d] | 30[d] | 30[e] | 30[d] | 30[d] | 15 | 30[e] |
| 52F | 5 | - | 4 | - | 10 | - | - | - | - | - | 12 | - |
| 53F | 8 | - | 7 | - | 10 | - | - | - | - | - | 10 | - |
| 63F | 3 | - | 3 | - | 30 | - | - | - | - | - | 10 | - |
| 760 | 7 | - | 7 | - | 12 | - | - | - | - | - | 12 | - |
| 764 | 4 | - | 4 | - | 30 | - | - | - | - | - | 30 | - |

Notes:

[a] Line 60: Combined headways for 60F, 60G, and 60E branches with several fit-in and turn-back points along routes.

[b] Line 401: 60 minute headway east of Valley and Azusa

[c] Line 402: 60 minute headway east of Eastland Center.

[d] Line 403 and 405: During off peak, shuttle between El Monte Station and eastern terminals only; no through service to Los Angeles CBD.

[e] Line 403, 404, 405: Service ends between 9-10 PM.

BUSWAY LINES

(For Service in Effect Jan-Mar, 1976)

SATURDAY

| Lines | EQUIPMENT | | | | HEADWAYS | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | WESTBOUND | | | | EASTBOUND | | | |
| | AM Peak | Base | PM Peak | Night | AM Peak | Base | PM Peak | Night | AM Peak | Base | PM Peak | Night |
| 60[a] | 11 | 11 | 12 | 6 | 30 | 30 | 30 | 30 | 30 | 30 | 30 | 30 |
| 401[b] | 6 | 6 | 6 | 3 | 30 | 30 | 30 | 120 | 30 | 30 | 30 | 120 |
| 402[c] | 7 | 7 | 7 | 1 | 30 | 30 | 30 | 90 | 30 | 30 | 30 | 90 |
| 403[d] | 4 | 4 | 4 | 2 | 30 | 30 | 30 | 30 | 30 | 30 | 30 | 30 |
| 404[d] | 2 | 2 | 2 | 0 | 30 | 30 | 30 | 30 | 30 | 30 | 30 | 30 |
| 405[d] | 2 | 2 | 2 | 0 | 30 | 30 | 30 | 30 | 30 | 30 | 30 | 30 |
| 52F | | | | | | | | | | | | |
| 43F | | | | | | | | | | | | |
| 63F | No Saturday Service | | | | | | | | | | | |
| 760 | | | | | | | | | | | | |
| 764 | | | | | | | | | | | | |

Notes:

[a] Line 60: Combined headways for 60F, 60G, and 60E.

[b] Line 401: 60 minute headway east of Valley and Azusa

[c] Line 402: 60 minute headway east of Eastland Center

[d] Line 403, 404, 405: All day Saturday, shuttle between El Monte Station and eastern terminal only; no through service to Los Angeles CBD. Service ends between 9-10 PM.

BUSWAY LINES

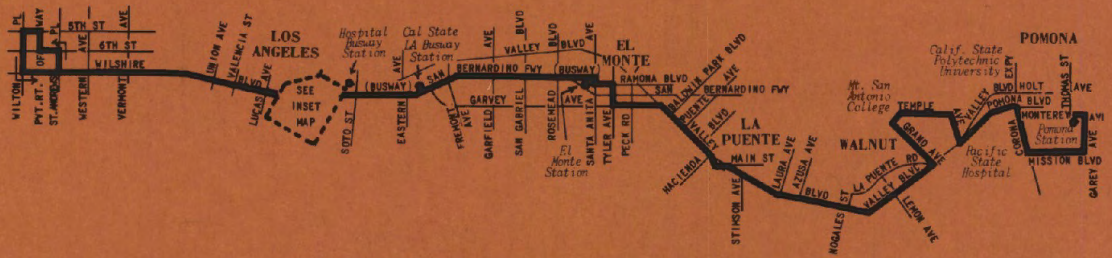
(For Service in Effect Jan-Mar, 1976)

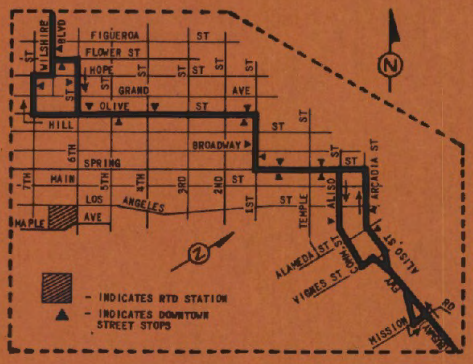
SUNDAY

| Lines | EQUIPMENT | | | | HEADWAYS | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | WESTBOUND | | | | EASTBOUND | | | |
| | AM Peak | Base | PM Peak | Night | AM Peak | Base | PM Peak | Night | AM Peak | Base | PM Peak | Night |
| 60 | 10 | 11 | 12 | 6 | 30 | 30 | 30 | 30 | 30 | 30 | 30 | 30 |
| 401 | 4 | 4 | 4 | 4 | 120 | 120 | 120 | 120 | 120 | 120 | 120 | 120 |
| 402[a] | | | | | 120 | 120 | 120 | 120 | 120 | 120 | 120 | 120 |
| 403 | | | | | | | | | | | | |
| 404 | | | | | | | | | | | | |
| 405 | | | | | | | | | | | | |
| 52F | | | | | | | | | | | | |
| 53 | No Sunday Service | | | | | | | | | | | |
| 63 | | | | | | | | | | | | |
| 760 | | | | | | | | | | | | |
| 764 | | | | | | | | | | | | |

Note: [a] Line 402, Sunday: Operated as part of Line 401.

# 401
# LINE PROFILE




RTD

SOUTHERN CALIFORNIA RAPID TRANSIT DISTRICT
SERVICE ANALYSIS SECTION

# CONTENTS





## About the 401 LINE PROFILE....

The 401 LINE PROFILE brings together into one report all readily available data which are relative to analysis of Line 401. It is designed to allow evaluation of Line 401 on the basis of: service provided, public utilization of the service, costs of operation and other factors.

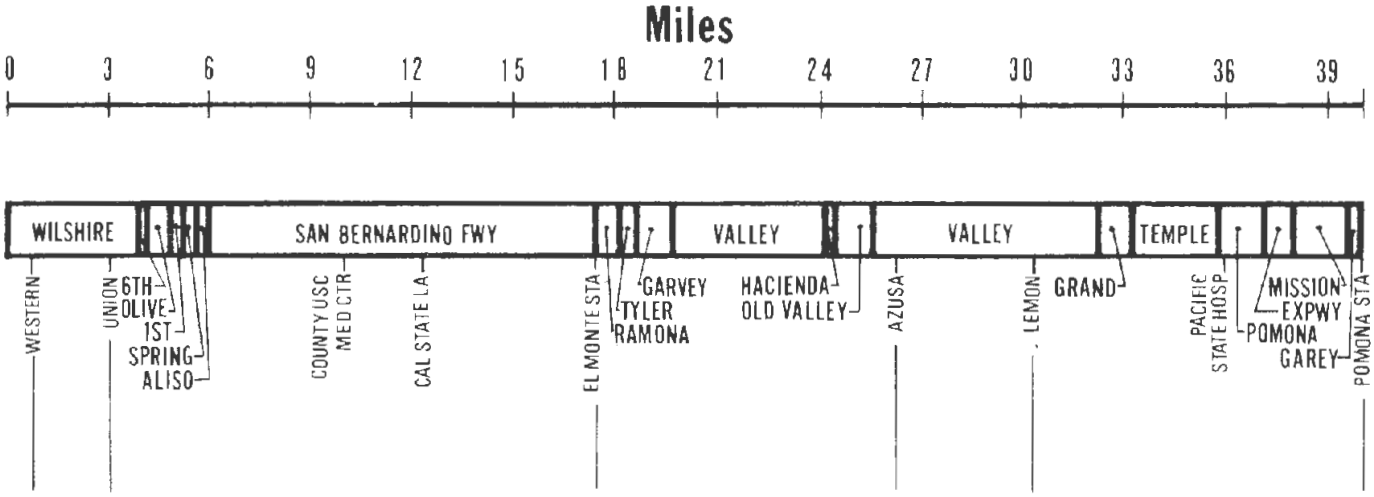
The Ridership Check which was made on Wednesday, October 15, 1975, is basic to the 401 LINE PROFILE. All other factors included in this report are those effective on the same date as the ridership check -- October 15, 1975. Thus all sections of the report are for a comparable time period.

The published Supervisor Summary in effect October 15, 1975, was the source for all of the data shown in the "Service" section of the report and also was the basis for the chart showing the number of buses in service under "Cost Factors". All data from the Supervisor Summary is shown for a typical weekday unless otherwise noted. Other data in the "Cost Factors" section originated from various pay time and mileage sheets for the period effective the date of the check.

# SERVICE

LINE 401

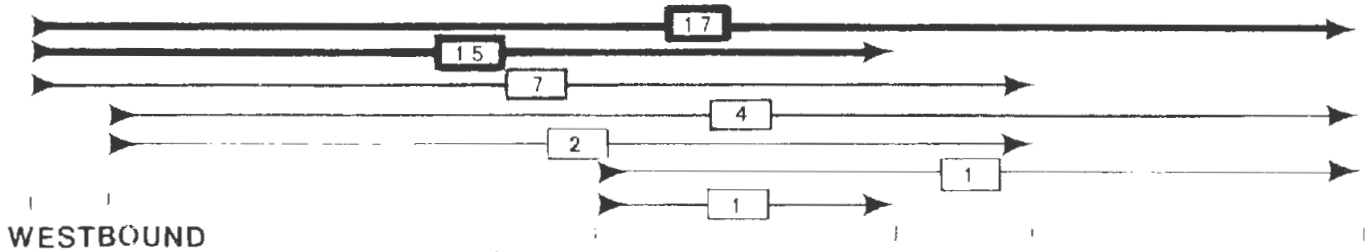
## LINE DIAGRAM



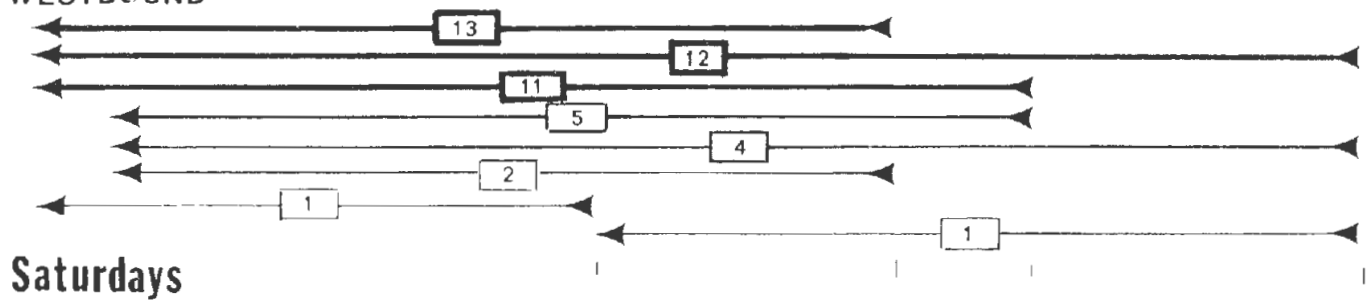

## TRIPS OPERATED (Number per Day)

### Weekdays

EASTBOUND

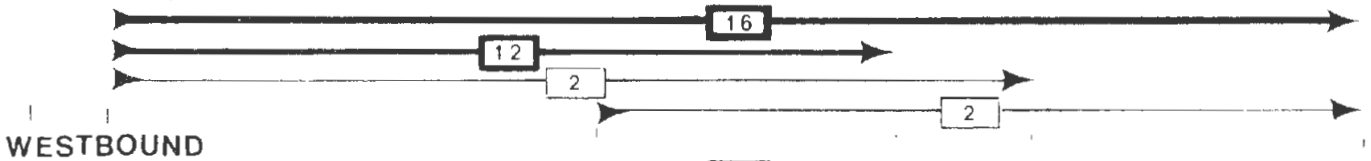



WESTBOUND

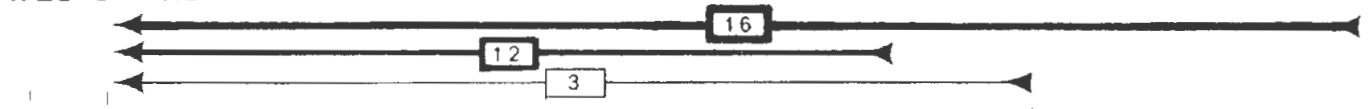



### Saturdays

EASTBOUND

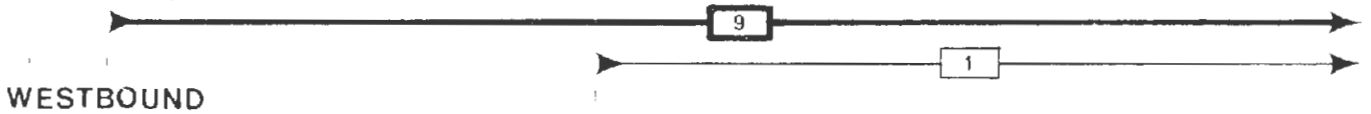



WESTBOUND




### Sundays & Holidays

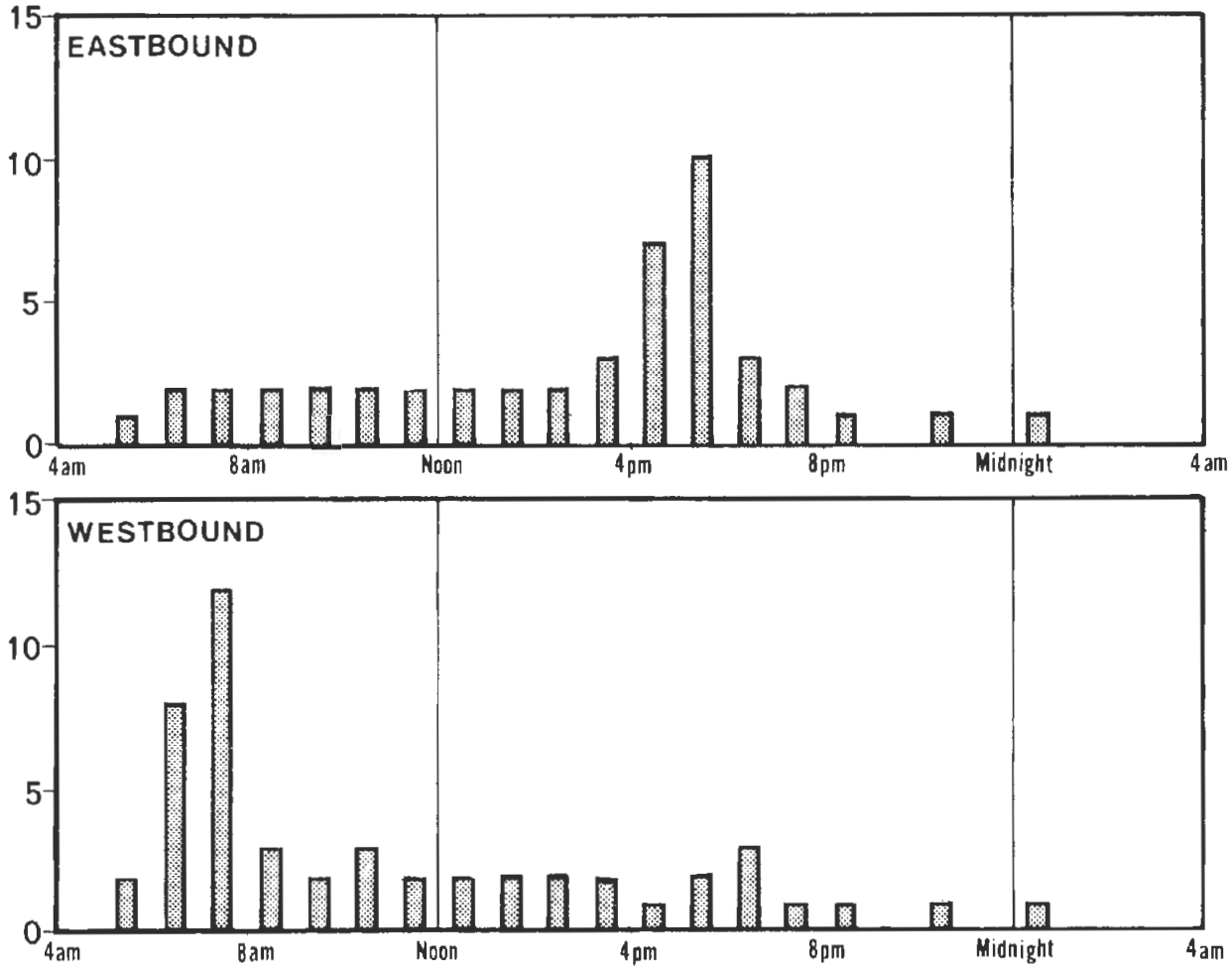
EASTBOUND




WESTBOUND

# TRIP FREQUENCY

## Buses per Hour at El Monte Station




# RUNNING TIME

**EASTBOUND**

| DEPARTURE TIME | 4:30 A.M. | 5:30 A.M. | 7:10 A.M. | 1:30 P.M. | 3:00 P.M. | 5:00 P.M. | 9:00 P.M. |
|---|---|---|---|---|---|---|---|
| MINUTES | 97 | 102 | 96 | 98 | 103 | 90 | 85 |

**WESTBOUND**

| DEPARTURE TIME | 5:00 A.M. | 7:00 A.M. | 11:50 A.M. | 1:30 P.M. | 3:05 P.M. | 3:50 P.M. | 5:20 P.M. | 7:00 P.M. |
|---|---|---|---|---|---|---|---|---|
| MINUTES | 91 | 94 | 98 | 101 | 105 | 109 | 93 | 90 |

# LINE SERVICE SPREAD

| FAR TERMINALS | FIRST DEPARTURE | LAST ARRIVAL |
|---|---|---|
| POMONA STATION | 5:41 A.M. | 1:47 A.M. |
| WALNUT (VALLEY at LEMON) | 5:04 A.M. | - |
| EL MONTE STATION | 5:40 A.M. | - |
| WILSHIRE at UNION | 6:29 A.M. | 12:35 A.M. |
| WILSHIRE at WESTERN | 6:49 A.M. | 6:15 P.M. |

# LINE USAGE

## LINE 401

A Ridership Check was made of Line 401 on Wednesday, October 15, 1975. The check consisted of checkers riding on all trips during the day of the check and recording various data. Among the data recorded were the number of passengers boarding and alighting at each stop along the route in each direction This data has been summarized and plotted on the Line Usage graphs on succeeding pages.

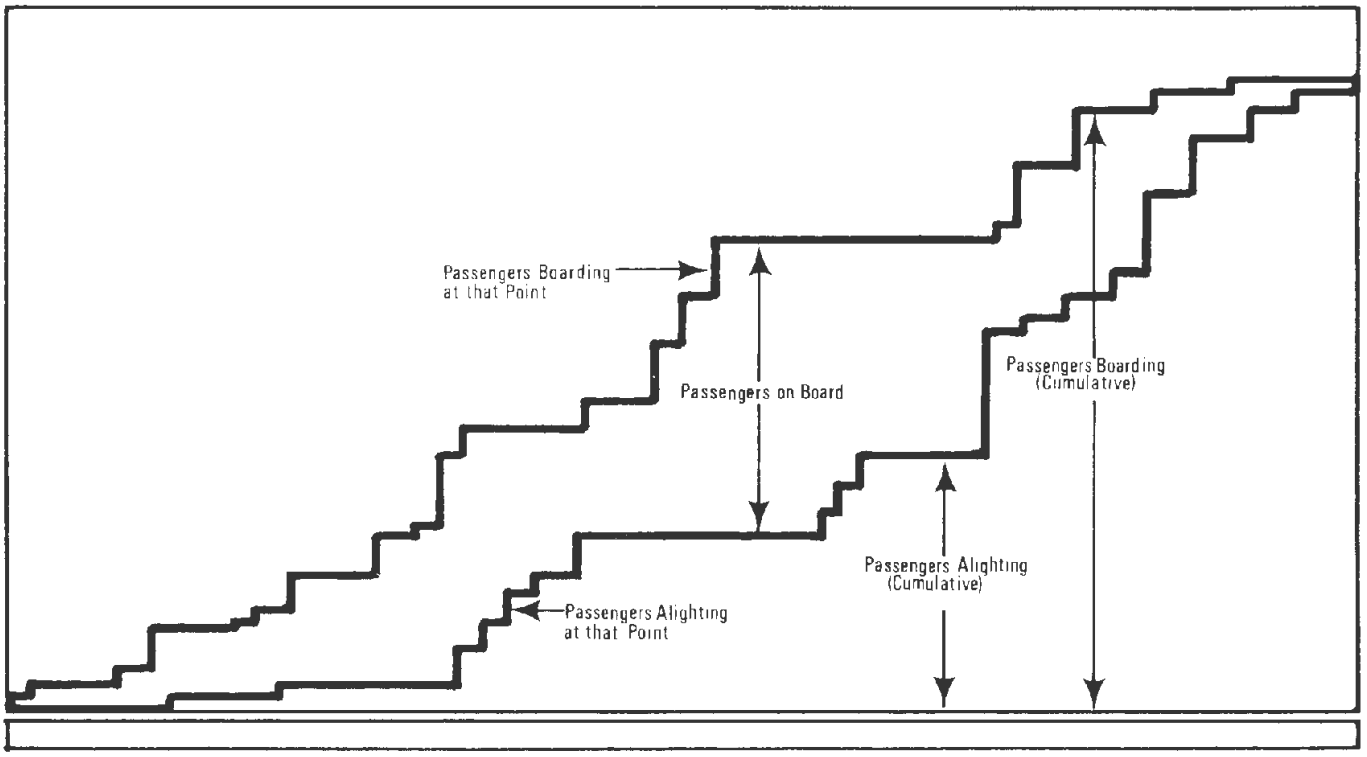
Each of the graphs represent an average trip during a particular time period on October 15, 1975. The grouping of the trips into time periods is accomplished by establishing one Alignment Point for each direction the Line travels. An Alignment Point is a point at which a time check is made. Data for all trips passing by this point during a particular time period are aggregated and averaged for comparability and plotting. The Alignment Point for both the Eastbound and Westbound trips on Line 401 was El Monte Station.

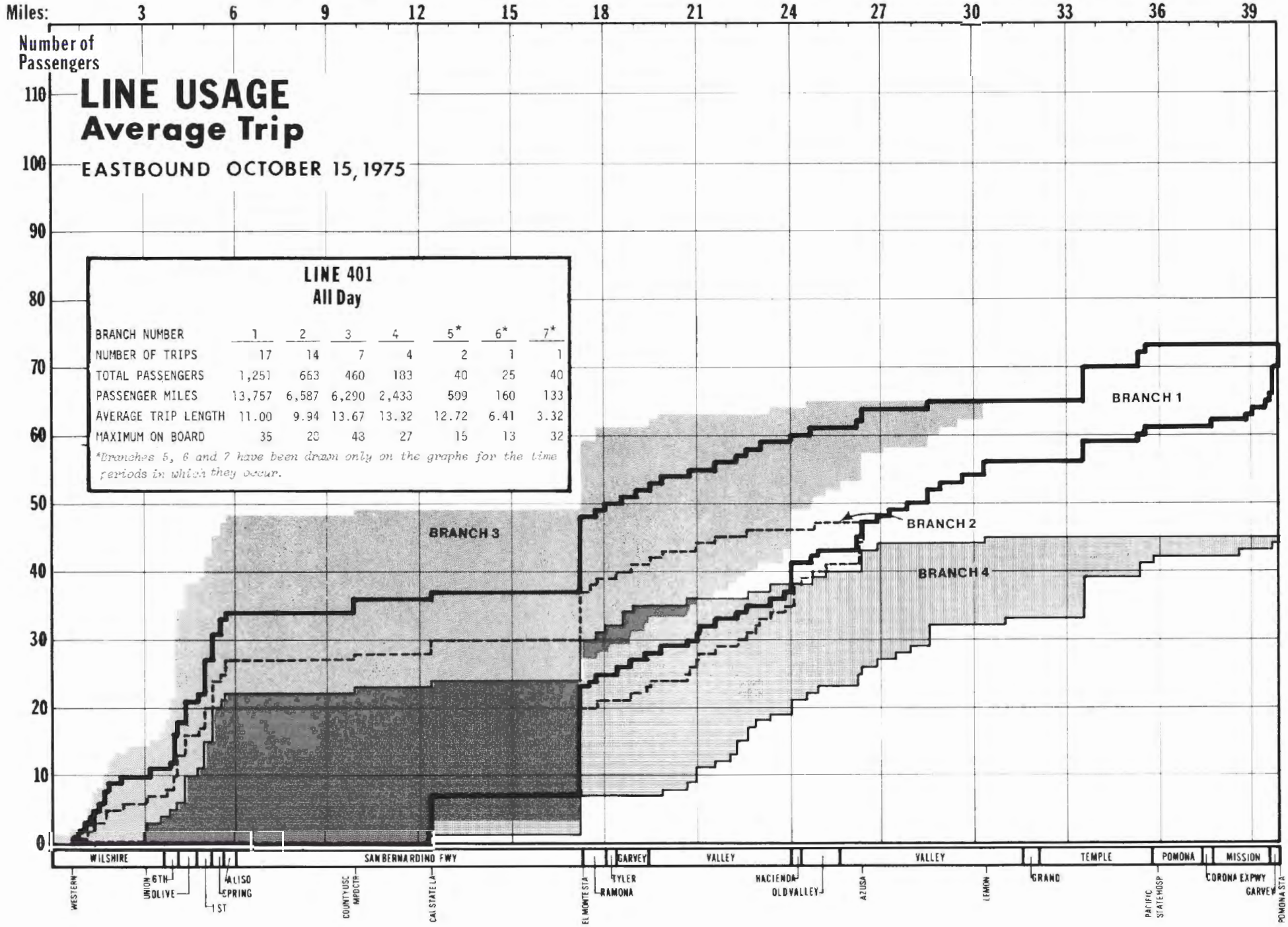
Line 401 Eastbound trips have been plotted from left to right on the Line Usage graphs and Westbound trips from right to left, and they should be read accordingly.

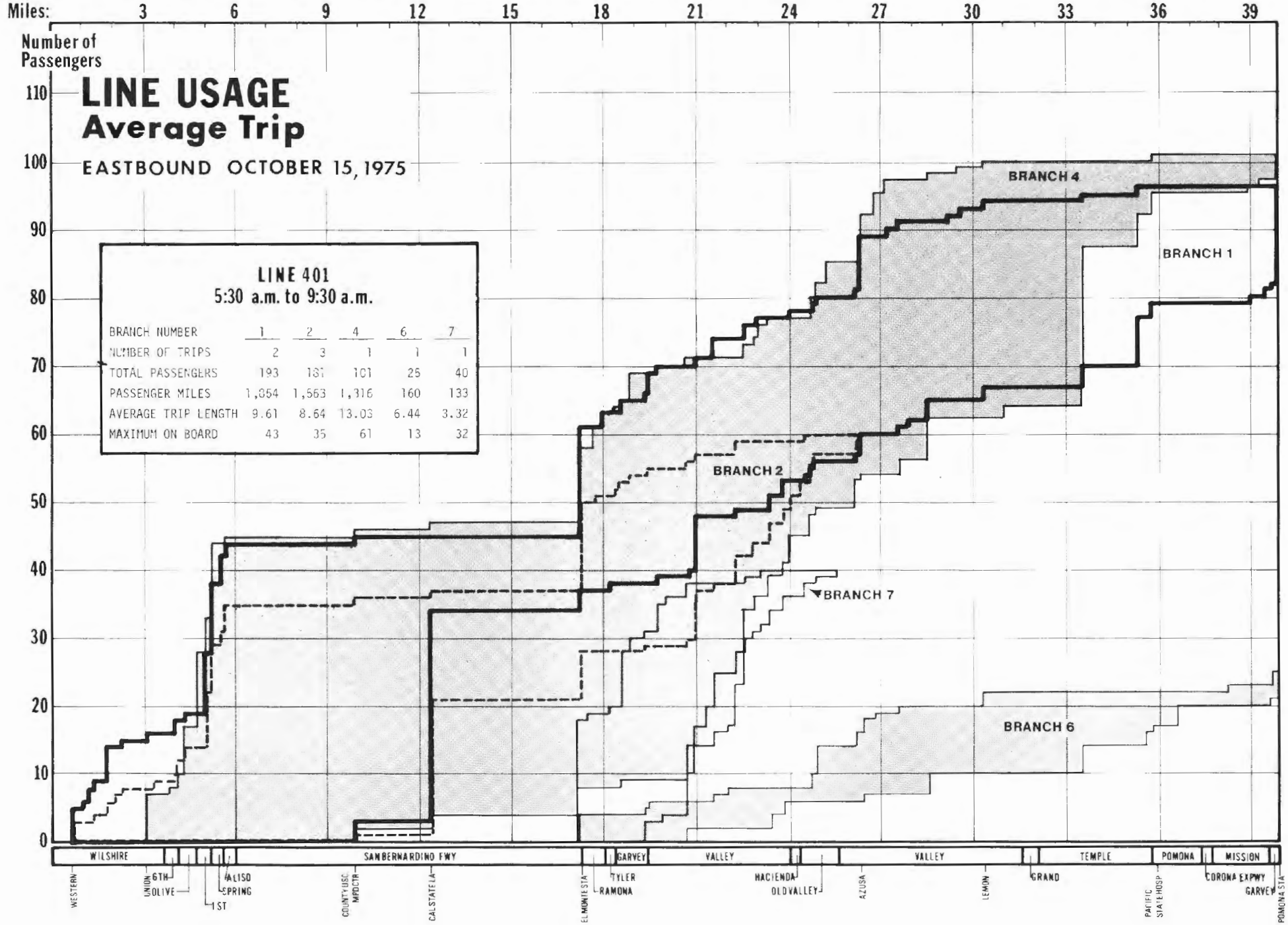
The top curve in all graphs represents passengers boarding. Measuring from the bottom of the graph to any point on the top curve will yield the number of passengers who have boarded from the beginning of the Line to that point on the route. Any portion of the top curve which is vertical is a measurement of the number of passengers boarding at that point only.

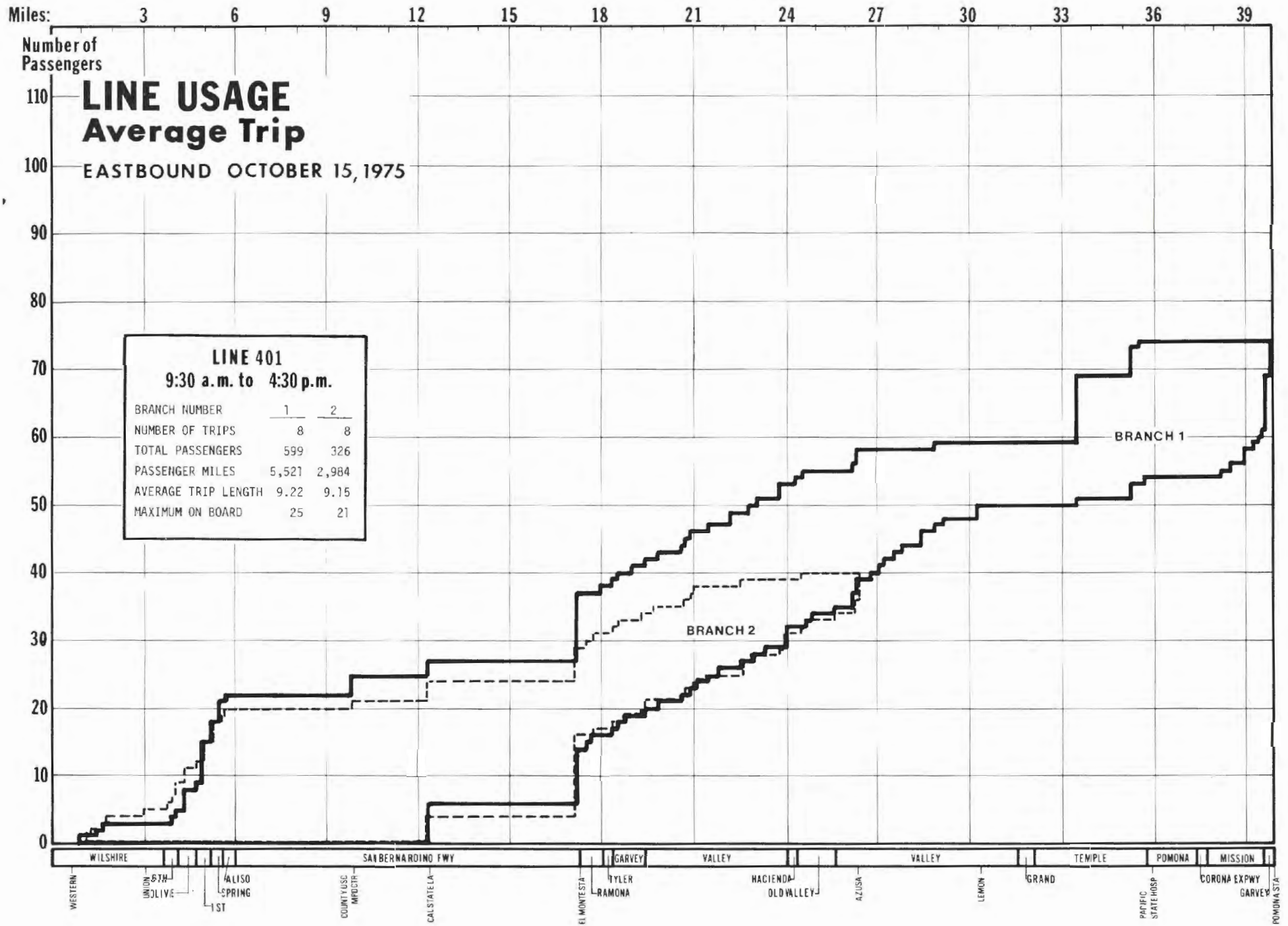
Similarly, the bottom curve in all graphs represents passengers alighting; and measuring from the bottom of the graph to any point on the bottom curve will show the number of passengers who have alighted from the beginning of the Line to that point on the route. Here too, any portion of the bottom curve which is vertical is a measurement of the number of passengers alighting only at that point.

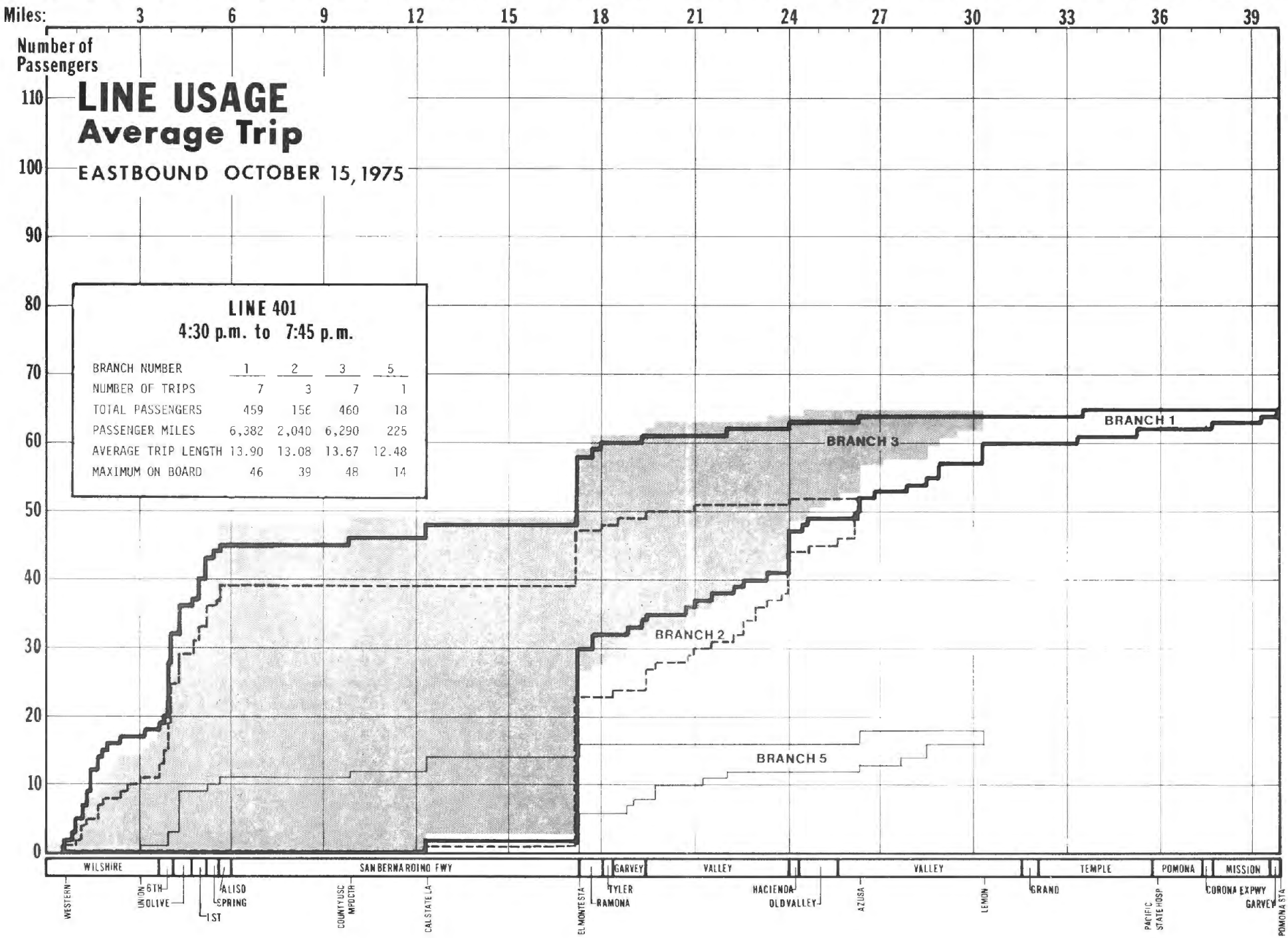
The passengers on board at any point of the Line is the vertical difference between the top curve (passengers boarding) and bottom curve (passengers alighting).



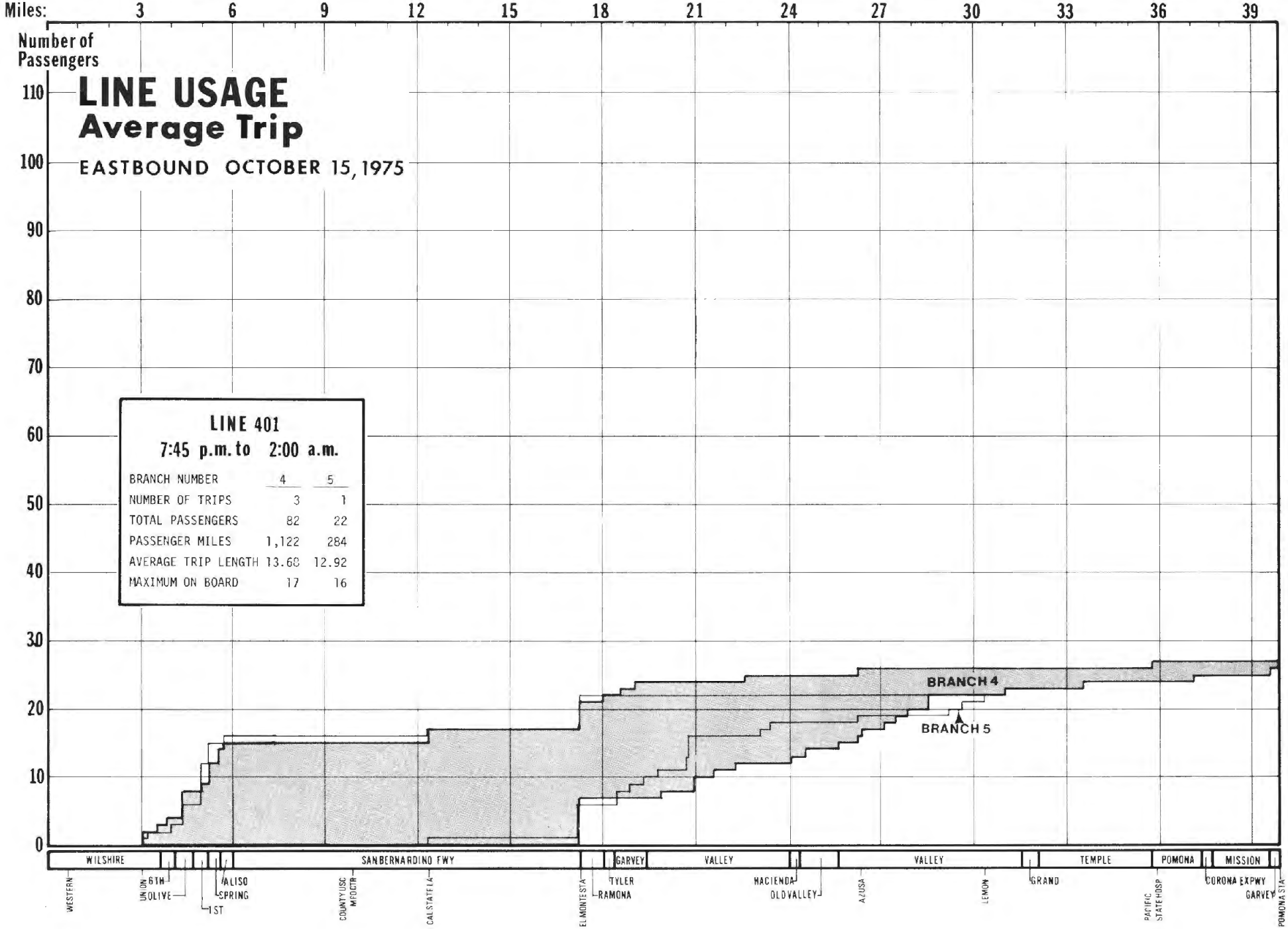

Miles: 3 6 9 12 15 18 21 24 27 30 33 36 39
Number of Passengers
110
100
90
80
70
60
50
40
30
20
10
0
LINE USAGE
Average Trip
EASTBOUND OCTOBER 15, 1975
LINE 401
All Day
BRANCH NUMBER 1 2 3 4 5* 6* 7*
NUMBER OF TRIPS 17 14 7 4 2 1 1
TOTAL PASSENGERS 1,251 663 460 183 40 25 40
PASSENGER MILES 13,757 6,587 6,290 2,433 509 160 133
AVERAGE TRIP LENGTH 11.00 9.94 13.67 13.32 12.72 6.41 3.32
MAXIMUM ON BOARD 35 28 48 27 15 13 32
*Branches 5, 6 and 7 have been drawn only on the graphs for the time periods in which they occur.
BRANCH 1
BRANCH 2
BRANCH 3
BRANCH 4
WILSHIRE
SAN BERNARDINO FWY
GARVEY
VALLEY
VALLEY
TEMPLE
POMONA
MISSION
WESTERN
UNION
6TH
OLIVE
1ST
ALISO
SPRING
COUNTY USC
MPDCTR
CAL STATE LA
EL MONTE STA
TYLER
RAMONA
HACIENDA
OLD VALLEY
AZUSA
LEMON
GRAND
PACIFIC
STATE HOSP
CORONA EXPWY
GARVEY
POMONA STA

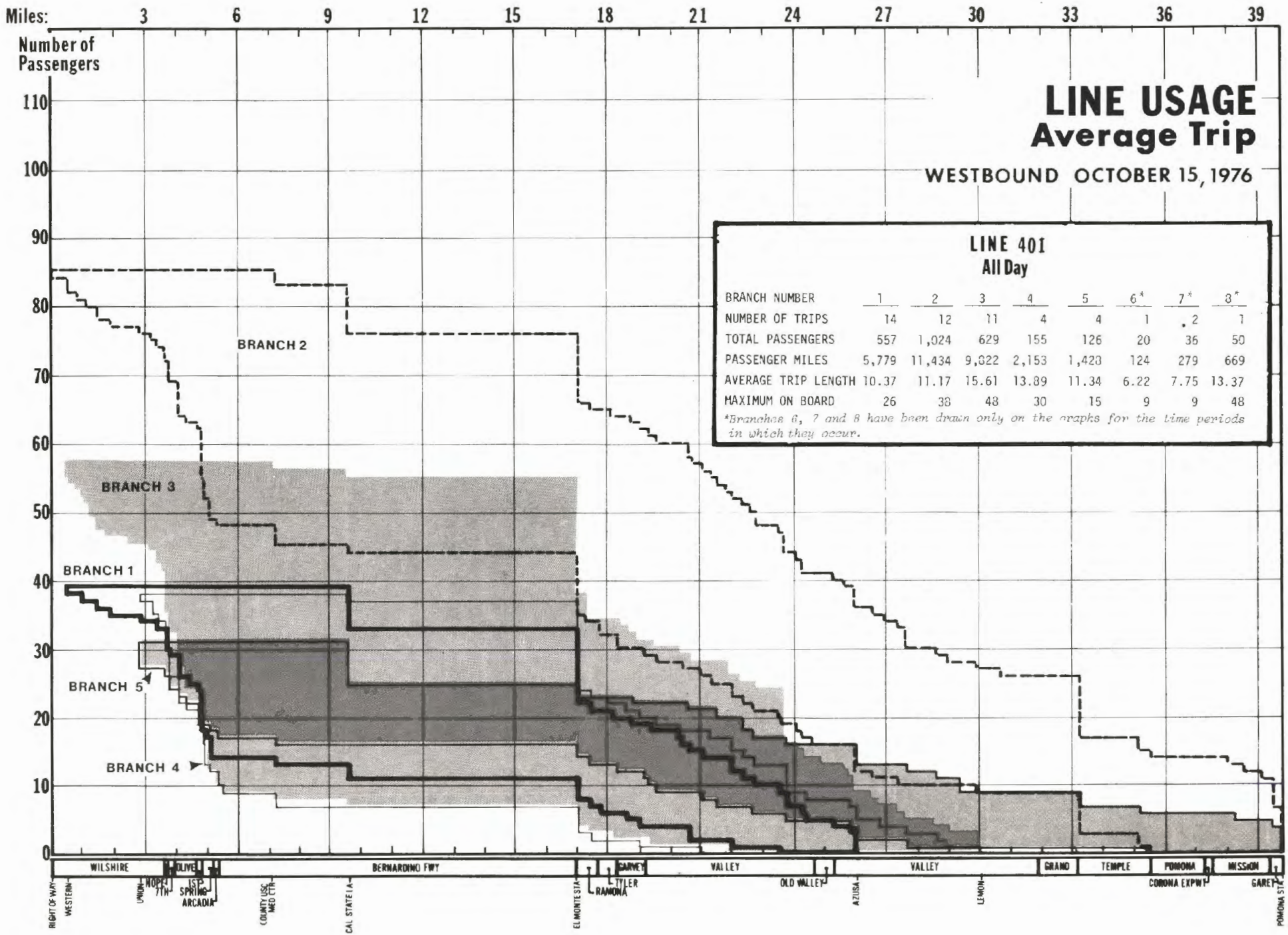

Miles: 3 6 9 12 15 18 21 24 27 30 33 36 39
Number of Passengers
110
100
90
80
70
60
50
40
30
20
10
0
LINE USAGE
Average Trip
EASTBOUND OCTOBER 15, 1975
LINE 401
5:30 a.m. to 9:30 a.m.
BRANCH NUMBER 1 2 4 6 7
NUMBER OF TRIPS 2 3 1 1 1
TOTAL PASSENGERS 193 181 101 25 40
PASSENGER MILES 1,854 1,563 1,316 160 133
AVERAGE TRIP LENGTH 9.61 8.64 13.03 6.44 3.32
MAXIMUM ON BOARD 43 35 61 13 32
BRANCH 4
BRANCH 1
BRANCH 2
BRANCH 7
BRANCH 6
WILSHIRE
SAN BERNARDINO FWY
GARVEY
VALLEY
VALLEY
TEMPLE
POMONA
MISSION
WESTERN
UNION
6TH
OLIVE
1ST
ALISO
SPRING
COUNTY USC
MPDCTR
CALSTATE LA
EL MONTE STA
TYLER
RAMONA
HACIENDA
OLD VALLEY
AZUSA
LEMON
GRAND
PACIFIC
STATE HOSP
CORONA EXPWY
GARVEY
POMONA STA

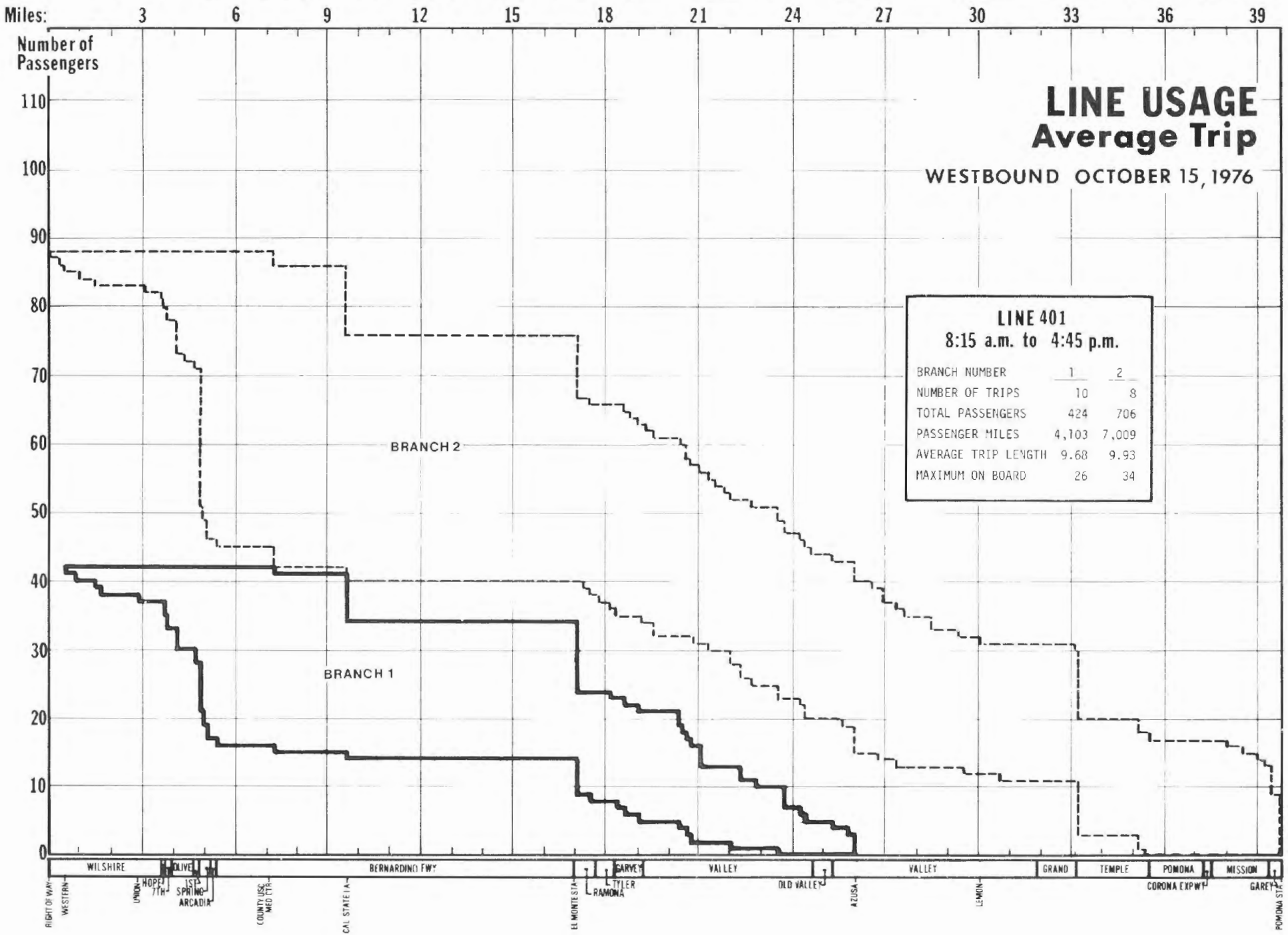

Miles: 3 6 9 12 15 18 21 24 27 30 33 36 39
Number of Passengers
110
100
90
80
70
60
50
40
30
20
10
0
LINE USAGE
Average Trip
EASTBOUND OCTOBER 15, 1975
LINE 401
9:30 a.m. to 4:30 p.m.
BRANCH NUMBER 1 2
NUMBER OF TRIPS 8 8
TOTAL PASSENGERS 599 326
PASSENGER MILES 5,521 2,984
AVERAGE TRIP LENGTH 9.22 9.15
MAXIMUM ON BOARD 25 21
BRANCH 1
BRANCH 2
WILSHIRE
SAN BERNARDINO FWY
GARVEY
VALLEY
VALLEY
TEMPLE
POMONA
MISSION
WESTERN
UNION
6TH
OLIVE
1ST
ALISO
SPRING
COUNTY USC
MPDCTR
CAL STATE LA
EL MONTE STA
TYLER
RAMONA
HACIENDA
OLD VALLEY
AZUSA
LEMON
GRAND
PACIFIC
STATE HOSP
CORONA EXPWY
GARVEY
POMONA STA

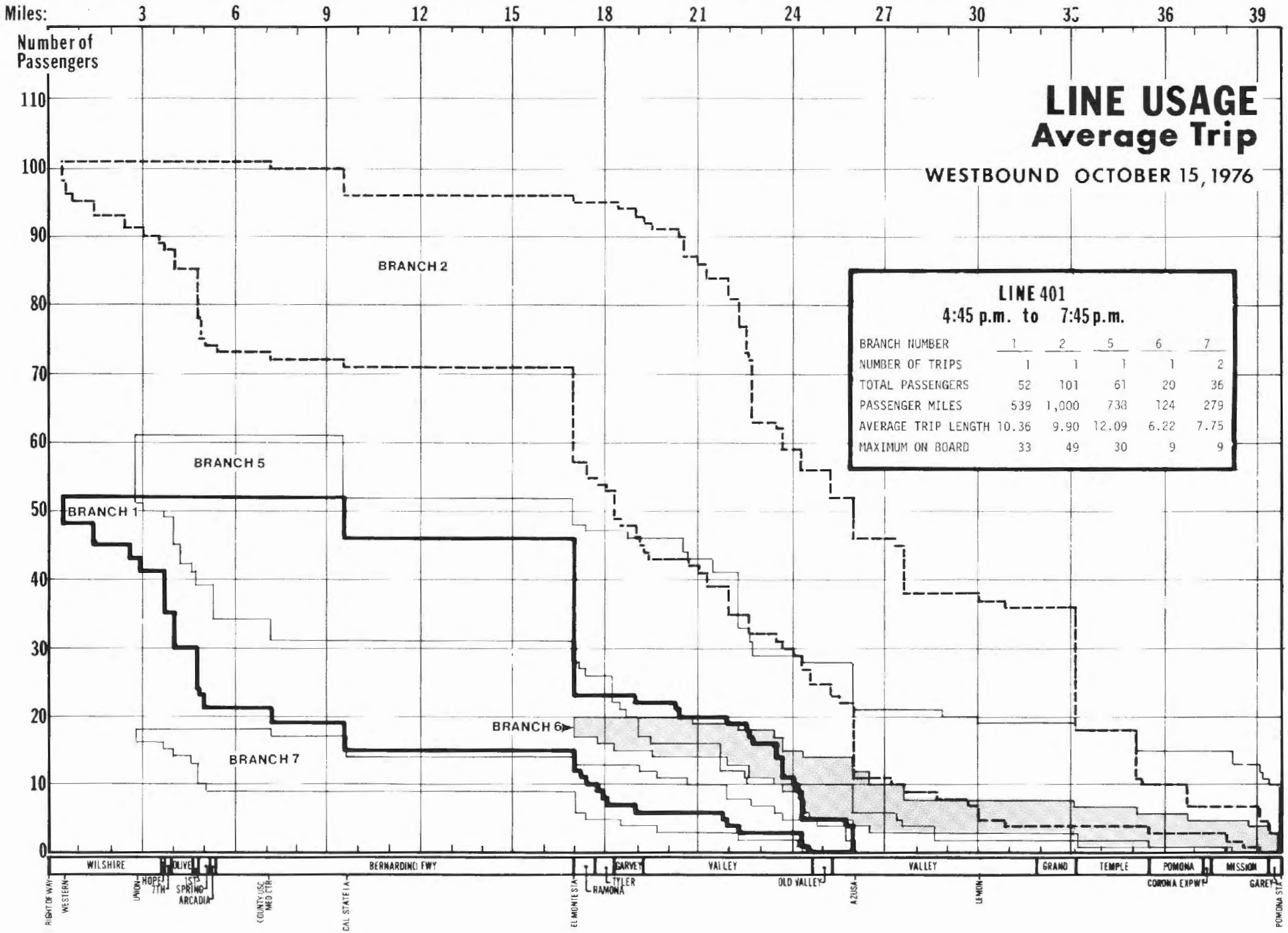


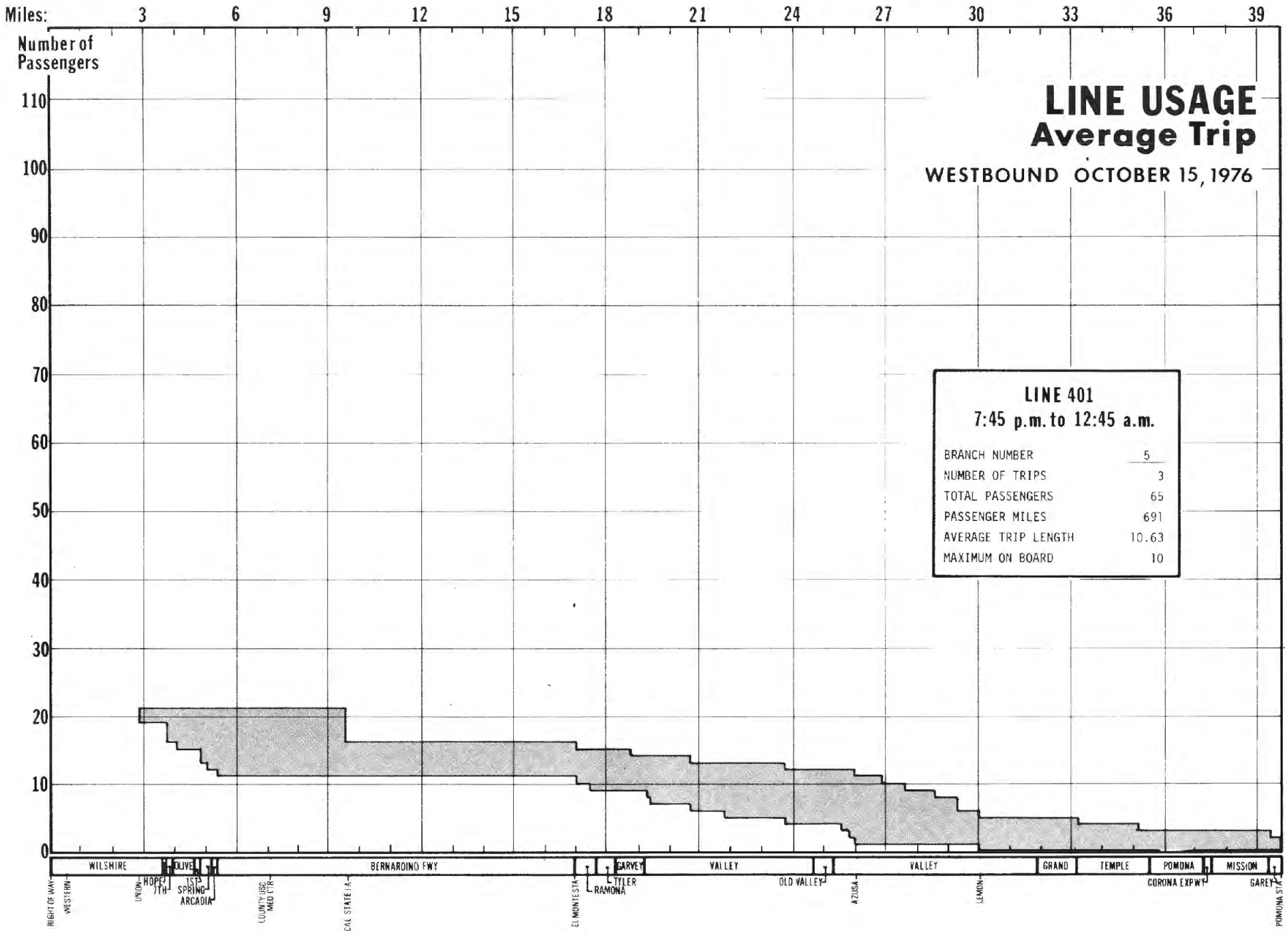

| BRANCH NUMBER | 1 | 2 | 3 | 5 |
|---|---|---|---|---|
| NUMBER OF TRIPS | 7 | 3 | 7 | 1 |
| TOTAL PASSENGERS | 459 | 156 | 460 | 18 |
| PASSENGER MILES | 6,382 | 2,040 | 6,290 | 225 |
| AVERAGE TRIP LENGTH | 13.90 | 13.08 | 13.67 | 12.48 |
| MAXIMUM ON BOARD | 46 | 39 | 48 | 14 |


Miles: 3 6 9 12 15 18 21 24 27 30 33 36 39
Number of Passengers
110
100
90
80
70
60
50
40
30
20
10
0
LINE USAGE
Average Trip
EASTBOUND OCTOBER 15, 1975
LINE 401
7:45 p.m. to 2:00 a.m.
BRANCH NUMBER 4 5
NUMBER OF TRIPS 3 1
TOTAL PASSENGERS 82 22
PASSENGER MILES 1,122 284
AVERAGE TRIP LENGTH 13.68 12.92
MAXIMUM ON BOARD 17 16
BRANCH 4
BRANCH 5
WILSHIRE
SAN BERNARDINO FWY
GARVEY
VALLEY
VALLEY
TEMPLE
POMONA
MISSION
WESTERN
UNION
6TH
OLIVE
1ST
ALISO
SPRING
COUNTY USC
MYDCTR
CAL STATE LA
ELMONTE STA
TYLER
RAMONA
HACIENDA
OLD VALLEY
AZUSA
LEMON
GRAND
PACIFIC STATE HOSP
CORONA EXPWY
GARVEY
POMONA STA


Miles: 3 6 9 12 15 18 21 24 27 30 33 36 39
Number of Passengers
110
100
90
80
70
60
50
40
30
20
10
0
LINE USAGE
Average Trip
WESTBOUND OCTOBER 15, 1976
LINE 401
All Day
BRANCH NUMBER 1 2 3 4 5 6* 7* 8*
NUMBER OF TRIPS 14 12 11 4 4 1 2 1
TOTAL PASSENGERS 557 1,024 629 155 126 20 36 50
PASSENGER MILES 5,779 11,434 9,822 2,153 1,428 124 279 669
AVERAGE TRIP LENGTH 10.37 11.17 15.61 13.89 11.34 6.22 7.75 13.37
MAXIMUM ON BOARD 26 38 48 30 15 9 9 48
*Branches 6, 7 and 8 have been drawn only on the graphs for the time periods in which they occur.
BRANCH 2
BRANCH 3
BRANCH 1
BRANCH 5
BRANCH 4
WILSHIRE
OLIVE
BERNARDINO FWY
GARVEY
VALLEY
VALLEY
GRAND
TEMPLE
POMONA
MISSION
RIGHT OF WAY
WESTERN
UNION
HOPE
7TH
ISP
SPRING
ARCADIA
COUNTY USC MED CTR
CAL STATE L.A.
EL MONTE STA
RAMONA
TYLER
OLD VALLEY
AZUSA
LEMON
CORONA EXPWY
GAREY
POMONA STA


Miles: 3 6 9 12 15 18 21 24 27 30 33 36 39
Number of Passengers
110
100
90
80
70
60
50
40
30
20
10
0
LINE USAGE
Average Trip
WESTBOUND OCTOBER 15, 1976
LINE 401
8:15 a.m. to 4:45 p.m.
BRANCH NUMBER 1 2
NUMBER OF TRIPS 10 8
TOTAL PASSENGERS 424 706
PASSENGER MILES 4,103 7,009
AVERAGE TRIP LENGTH 9.68 9.93
MAXIMUM ON BOARD 26 34
BRANCH 2
BRANCH 1
WILSHIRE
BERNARDINO FWY
VALLEY
VALLEY
GRAND
TEMPLE
POMONA
MISSION
RIGHT OF WAY
WESTERN
UNION
HOPE
7TH
OLIVE
1ST
SPRING
ARCADIA
COUNTY USC MED CTR
CAL STATE L.A.
EL MONTE STA
RAMONA
GARVEY
TYLER
OLD VALLEY
AZUSA
LEMON
CORONA EXPWY
GAREY
POMONA STA


Miles: 3 6 9 12 15 18 21 24 27 30 33 36 39
Number of Passengers
110
100
90
80
70
60
50
40
30
20
10
0
LINE USAGE
Average Trip
WESTBOUND OCTOBER 15, 1976
BRANCH 2
BRANCH 5
BRANCH 1
BRANCH 6
BRANCH 7
LINE 401
4:45 p.m. to 7:45 p.m.
BRANCH NUMBER 1 2 5 6 7
NUMBER OF TRIPS 1 1 1 1 2
TOTAL PASSENGERS 52 101 61 20 36
PASSENGER MILES 539 1,000 738 124 279
AVERAGE TRIP LENGTH 10.36 9.90 12.09 6.22 7.75
MAXIMUM ON BOARD 33 49 30 9 9
WILSHIRE
BERNARDINO FWY
VALLEY
VALLEY
GRAND
TEMPLE
POMONA
MISSION
RIGHT OF WAY
WESTERN
UNION
HOPE
7TH
OLIVE
1ST
SPRING
ARCADIA
COUNTY USC MED CTR
CAL STATE LA
EL MONTE STA
GARVEY
RAMONA
TYLER
OLD VALLEY
AZUSA
LEMON
CORONA EXPWY
GAREY
POMONA STA


Miles: 3 6 9 12 15 18 21 24 27 30 33 36 39
Number of Passengers
110
100
90
80
70
60
50
40
30
20
10
0
LINE USAGE
Average Trip
WESTBOUND OCTOBER 15, 1976
LINE 401
7:45 p.m. to 12:45 a.m.
BRANCH NUMBER 5
NUMBER OF TRIPS 3
TOTAL PASSENGERS 65
PASSENGER MILES 691
AVERAGE TRIP LENGTH 10.63
MAXIMUM ON BOARD 10
WILSHIRE
OLIVE
BERNARDINO FWY
GARVEY
VALLEY
VALLEY
GRAND
TEMPLE
POMONA
MISSION
RIGHT OF WAY
WESTERN
UNION
HOPE
7TH
1ST
SPRING
ARCADIA
COUNTY USC MED CTR
CAL STATE LA
EL MONTE STA
RAMONA
TYLER
OLD VALLEY
AZUSA
LEMON
CORONA EXPWY
GAREY
POMONA STA

# COST FACTORS

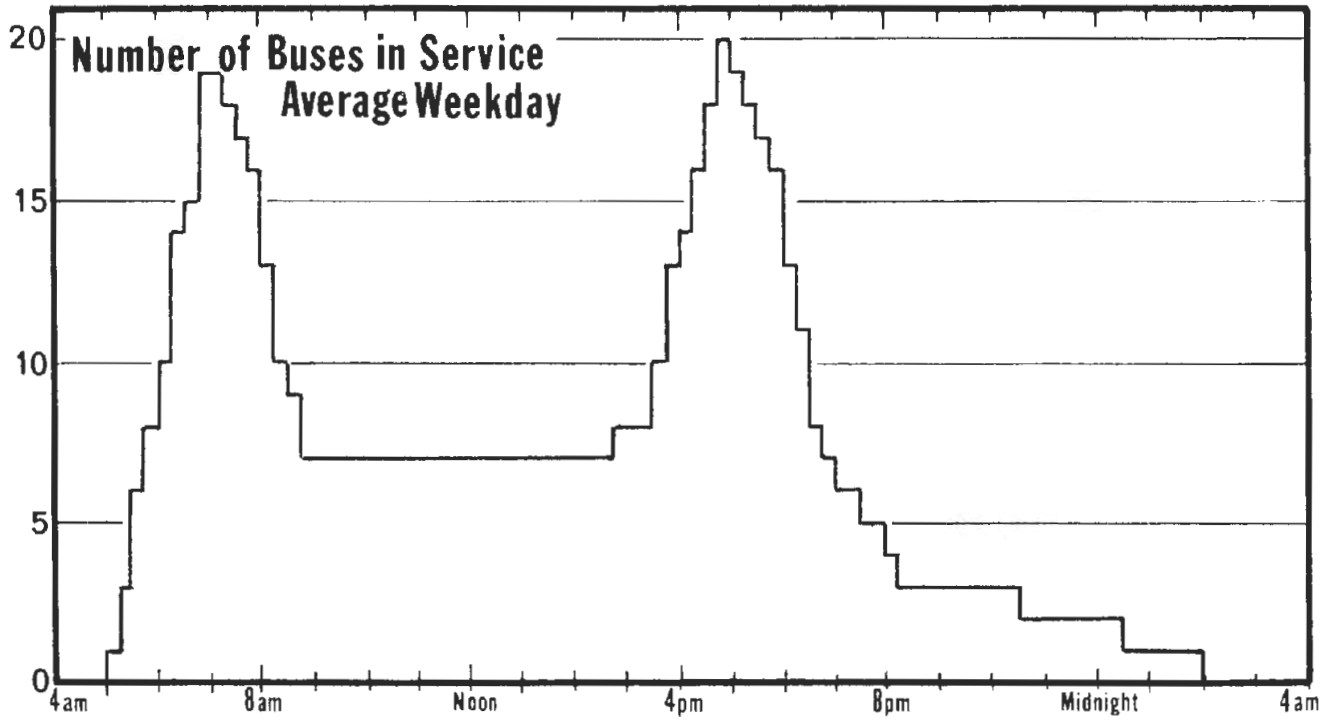
LINE 401

## TIME VARIABLES

## MILEAGE VARIABLES

| | | DAILY AVERAGE | | | ANNUAL TOTAL | INDEX |
|---|---|---|---|---|---|---|
| | | WEEKDAYS | SATURDAYS | SUNDAYS & HOLIDAYS | | |
| SCHEDULED VEHICLE HOURS: | IN SERVICE | 129 | 71 | 55 | 40,000 | 60.5 |
| | TOTAL | 191 | 104 | 78 | 58,700 | 88.8 |
| SCHEDULED DRIVER PAY HOURS | | 217 | 113 | 84 | 66,100 | 100.0 |
| ACTUAL DRIVER PAY HOURS | | 267 | 115 | 88 | 79,200 | 119.8 |
| SCHEDULED VEHICLE MILES: | IN SERVICE | 3,061 | 1,904 | 1,529 | 968,200 | 75.6 |
| | TOTAL | 4,207 | 2,234 | 1,575 | 1,280,300 | 100.0 |
| ACTUAL VEHICLE MILES | | 4,218 | 2,235 | 1,575 | 1,283,200 | 100.2 |

## EQUIPMENT PROFILE




## TOTAL ANNUAL LINE COST

$1,476,700

# APPENDIX B

# SURVEY QUESTIONNAIRES

Int. _____
Cl. No. _____
Q. No. _____

# HOUSEHOLD SURVEY

Please help us evaluate the San Bernardino Freeway by taking 4 minutes to fill out this confidential questionnaire.

1. What is the number of the downtown zone in which you work? _____

2. At what time did you begin your last trip to downtown Los Angeles:

| | |
|---|---|
| 1☐ before 6:00 | 5☐ 7:31 – 8:00 |
| 2☐ 6:01 – 6:30 | 6☐ 8:01 – 8:30 |
| 3☐ 6:31 – 7:00 | 7☐ 8:31 – 9:00 |
| 4☐ 7:01 – 7:30 | 8☐ after 9:00 |

3. How did you travel from your home to downtown Los Angeles on your last morning work trip?

1☐ car (used for the entire trip to work)
2☐ bus (whether or not you used an auto to get to the bus)

**BUS RIDERS PLEASE SKIP TO QUESTION NO. 19**

4. When you made your last trip downtown, were you:

1☐ driving alone
2☐ the regular driver carrying regular passengers
3☐ a regular passenger
4☐ an alternate driver, whether you were a driver or passenger that day

**IF YOU DROVE ALONE**

5. Do you pay for all costs for operating your car (gas, repairs, etc.)?

1☐ yes 2☐ no

6. If you don't pay all costs, which costs don't you pay for?

1☐ gas
2☐ repairs, routine maintenance
3☐ insurance
4☐ registration
5☐ other _____
(explain)

7. Were you reimbursed for mileage to work on your last trip?

1☐ yes 2☐ no

8a. Do you pay for parking downtown: 1☐ yes 2☐ no

8b. If yes, how much? $_____ per ☐day ☐week ☐month
(check one)

**IF YOU DROVE WITH SOME ONE**

9. How many adults (over 16) were in the car when you made your last trip downtown? (including the driver) _____
(number of adults)

10. How many stops to pick up passengers were made after you were in the car? _____
(number of stops)

11. How many stops were made to drop off passengers before you left the car?
_____
(number of stops)

12a. If you were in a carpool, how much did you pay (or usually pay) the others for riding? $ _____ per ☐day ☐week ☐month
(check one)

12b. What was the TOTAL amount that you received (or usually received) for driving?
$_____ per ☐day ☐week ☐month
(check one)

13a. What was the vehicle parking cost? $ _____ per ☐day ☐week ☐month
(check one)

13b. Who paid this cost? _____

14. What other costs did you have, if any (for example, downtown bus travel)?
$_____ per ☐day ☐week ☐month for _____
(check one) (item)

**ALL AUTO USERS**

15. After parking or leaving the car, how many blocks do you walk to your office or work station?

1☐ less than 1 block
2☐ 1–2
3☐ 3–4
4☐ 5–6
5☐ 7–8
6☐ 9–10
7☐ more than 10

16. Could you have used a busway bus to go downtown?

1☐ yes 2☐ no

17. Have you ever used a busway bus to go to downtown Los Angeles?

1☐ yes 2☐ no

18. Why do you use a car rather than the bus to go downtown?
(You may check more than one answer)

1☐ must have my car for use during the day
2☐ too far to bus stop
3☐ bus would take too long
4☐ don't know where to get bus
5☐ dislike buses
6☐ car is less expensive
7☐ I prefer being in a carpool
8☐ other _____
(explain)

AUTO USERS NOW SKIP TO QUESTION NO. 26

BUS USERS

19. Where did you get on the bus?

1☐ street corner _____
(intersection)
2☐ El Monte Station
3☐ San Gabriel park-and-ride
4☐ other _____

20. What busline did you use? _____
(number)

21. If you walked to the bus stop, how many blocks did you walk?

1☐ less than 1 block
2☐ 1–2
3☐ 3–4
4☐ 5–6
5☐ 7–8
6☐ 9–10
7☐ more than 10

22. After getting off the bus, how many blocks did you walk to get to your office or work station:

1☐ less than 1 block
2☐ 1–2
3☐ 3–4
4☐ 5–6
5☐ 7–8
6☐ 9–10
7☐ more than 10

23. Do you buy your bus ticket each day or by the month?

1☐ daily
2☐ monthly discount

24a. Do you pay for parking at the bus stop or station?

1☐ yes
2☐ no

24b. If yes, how much do you pay? $_____ per ☐day ☐week ☐month
(check one)

25. How many months have you been using the bus regularly to ride to downtown Los Angeles? _____ years _____months

**EVERYONE**

Please indicate your degree of agreement or disagreement with statements 26 through 31.

| | 1 Strongly Agree | 2 Agree | 3 No Opinion | 4 Disagree | 5 Strongly Disagree |
|---|---|---|---|---|---|
| 26. I enjoy driving on freeways. | ☐ | ☐ | ☐ | ☐ | ☐ |
| 27. The morning traffic makes driving to work irritating. | ☐ | ☐ | ☐ | ☐ | ☐ |
| 28. I feel tense when I can't go faster than 30 mph on the freeway. | ☐ | ☐ | ☐ | ☐ | ☐ |
| 29. If public transportation were more convenient, I would prefer to take the bus to work. | ☐ | ☐ | ☐ | ☐ | ☐ |
| 30. If I had to drive downtown to work in stop-and-go traffic (less than 10 mph), I'd rather take a bus. | ☐ | ☐ | ☐ | ☐ | ☐ |
| 31. If I could drive downtown at 60 mph, I would not consider taking a bus downtown to work. | ☐ | ☐ | ☐ | ☐ | ☐ |

*Weren't analyzed.

32.* If a convenient downtown bus were available, I would rather wait 15 minutes for the bus than drive downtown on the freeway: (check highest speed at which you still agree with statement)

1☐ in stop-and-go traffic
2☐ at 15 mph
3☐ at 30 mph
4☐ at 45 mph
5☐ at 60 mph
6☐ at any speed

33.* Driving to work at 20 mph on a crowded freeway is worse than waiting:

1☐ 30 min. for a bus
2☐ 20 min. for a bus
3☐ 10 min. for a bus
4☐ always better than wating for a bus

34. How many autos are available for use by you and other members of your household?_____

(number of cars)

35. How many drivers are there in your household?_____

(number of drivers)

EVERYONE

36. Your Sex:

1☐ Male
2☐ Female

37. Your Age:

1☐ 16–29
2☐ 30–39
3☐ 40 or over

38. What is the combined income of all household members?

1☐ zero to $10,000
2☐ $10,001 to $15,000
3☐ $15,001 to $30,000
4☐ more than $30,000

39. How many people contribute to that total income?

☐1 ☐2 ☐3 ☐4 or more

In case we need to check back with you, would you please provide us with your telephone number? Telephone _____

# *We missed you while you were out...*

We are conducting a survey (sponsored by the Southern California Association of Governments) of the public's reaction to the new highway improvements on the San Bernardino Freeway. You can help us with our evaluation by answering the following questions and using the pre-addressed and pre-stamped envelope provided.

**Do you or other members of your household regulary work in Los Angeles?**

☐ yes ☐ no ☐ number of workers

**Are you aware that a busway using exclusive lanes in the median strip has been built and is in operation?**

☐ yes ☐ no

**Whether or not you use the busway, do you think it is a good idea?**

☐ yes ☐ no

If your answer to the first question (work in Los Angeles?) is "NO", you need not fill out the rest of the questionnaire. Please mail this page back to us in the enclosed envelope.

If your answer to the first question is "YES", please continue on to the next map page.

*Thank you— for your help*

Please use the map below to determine the zone number in which you work.*

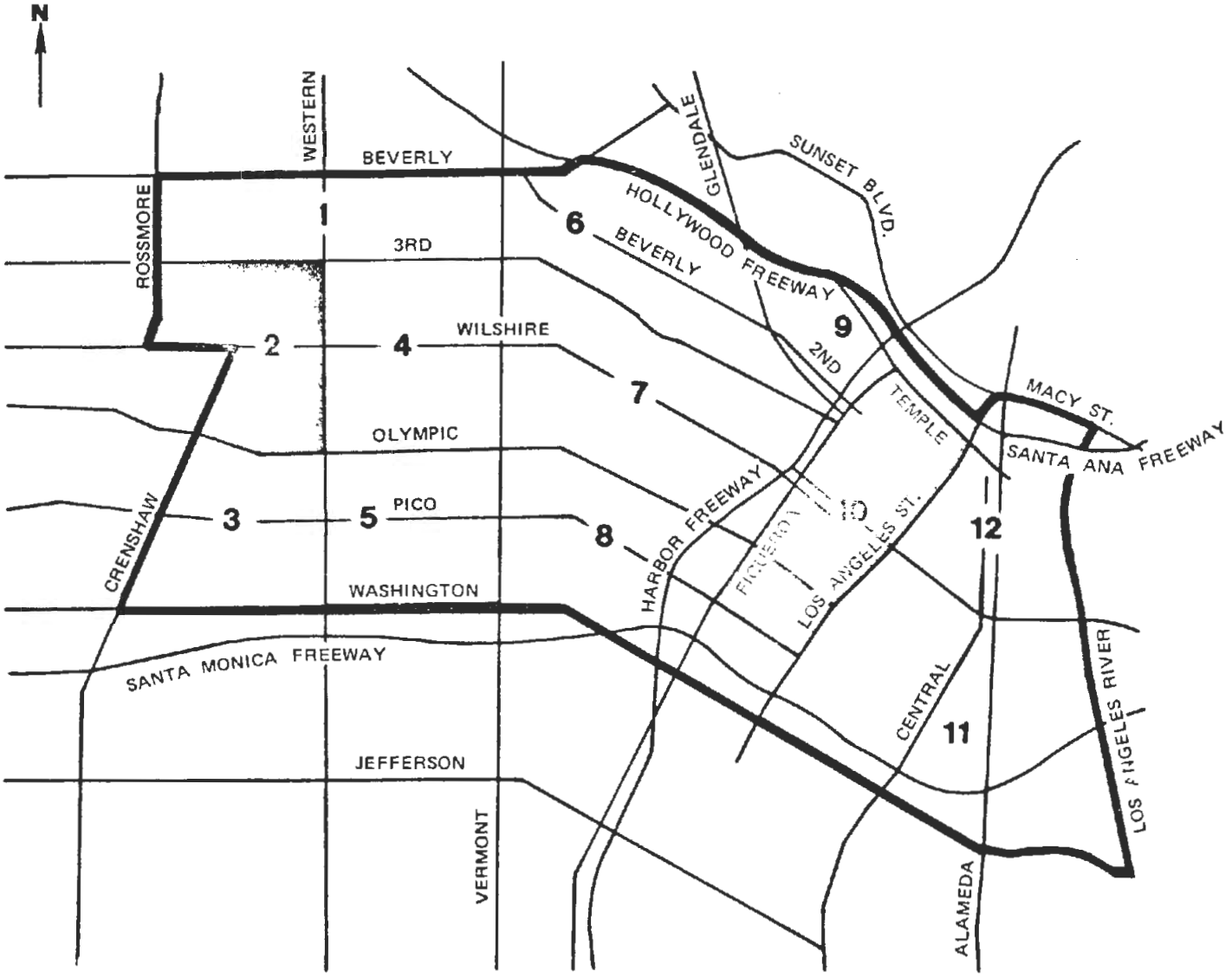
☐ ZONE NUMBER

☐ DO NOT WORK IN ONE OF THESE ZONES.

IF YOU DO NOT WORK IN ONE OF THESE DOWNTOWN ZONES, you need not fill out the rest of the questionnaire. Please mail these first two pages back to us in the enclosed envelope.

IF YOU DO WORK IN ONE OF THESE DOWNTOWN ZONES, please fill in the 4 minute questionnaire which follows.

*If there is more than one member of your household who works in one of these downtown zones, please contact us at 282-0558 and we will send a questionnaire for each additional person.



# *We missed you while you were out...*

Dear Downtown Worker,

Five minutes on your part can help your local government plan transportation improvements in the Los Angeles Area. Your assistance is VERY IMPORTANT because your household is part of a small group of households that has been scientifically selected to represent the whole population. This is the only inexpensive and statistically valid method for government to know what the public wants. Please help us!!

One of our survey data-takers has been to your home and was told that you regularly work in the downtown LA area. We need the questionnaire left with you to be filled out and returned to us. If you will be home later this evening, we have made arrangements to come back to collect the questionnaire. Otherwise, please use the attached envelope – all ready for mailing.

Sincerely,

Sydwell Flynn

Sydwell Flynn
Survey Coordinator
Bigelow-Crain Associates

# *Thank you— for your help*