Survey of Los Angeles Traffic Characteristics

K. A. STONEX, *Assistant Director,*
General Motors Proving Ground, Milford, Mich.

During May 1956, the Traffic Survey Panel of the Vehicle Combustion Products Subcommittee of the Automobile Manufacturers Association made a survey of traffic in Los Angeles, with the cooperation of the Los Angeles Air Pollution Control District. The objective was to determine the specific proportions of certain phases of vehicle operation in the traffic stream, so that the estimates of the contribution of automotive vehicles to the smog problem could be refined.

These studies were supplemented by using the statistical instruments developed by the Vehicle Characteristics Committee of the Department of Traffic and Operations of the Highway Research Board, so that a permanent record of traffic flow characteristics measured by recognized techniques could be obtained.

This paper summarizes the characteristics of Los Angeles traffic observed on the typical traffic route and on the following type routes: (a) freeway; (b) surface arterial streets; (c) business section streets; and (d) residential section streets. Comparisons with earlier observations of traffic characteristics on certain Detroit streets are made.

• THE STATISTICAL INSTRUMENTS used in this survey were developed initially by the Vehicle Characteristics Committee under the chairmanship of T. J. Carmichael. The nature of the instruments and a summary of the results of observations as an application of their use to the study of traffic patterns were reported in 1951 (*1*).

A second set of instruments, using the same principles and giving comparable results, but modified in details of construction was built by the General Motors Proving Ground and was used in this study.

Figure 1 is a schematic diagram of the instrument recording speed characteristics (*1*). The heart of the instrument is the distributing speedometer seen at the lower left. This is a mechanical speedometer driven by a T take-off from the regular speedometer cable of the car. The indicating hand of the speedometer is replaced with an arm which slides over a sector divided into contact plates so designed that each one covers a specific increment of speed. Each contact is connected electrically to an electric counter. The circuit from the back of the counter is connected to an electric timer, through a battery, to the swinging arm of the speedometer, completing the electrical circuit through grounded connections.

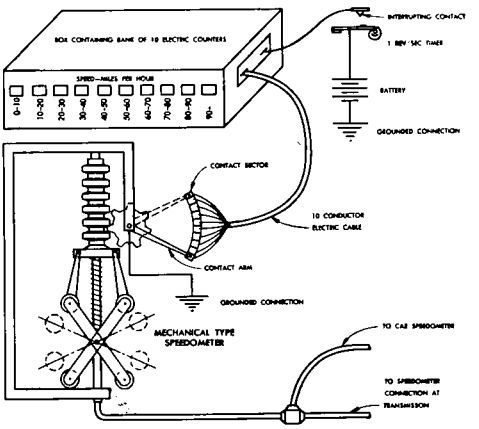

Figure 1. Schematic diagram of speed distributing instrument.

Each counter in the speed bank represents a speed range in mph. A timing pulse is generated each second, and

it is distributed to one of the counters in the bank according to the position of the swinging arm. A separate counter lists the total number of counts.

At the end of any trip, the number totaled on any counter represents the number of seconds during the trip that the vehicle was traveling in that speed range. Data from all the counters, plotted against the increments of speed range covered by the sectors, give a frequency diagram of speed distribution in terms of the total number of seconds operated at each increment of speed. In general, values are expressed in percent of the total time, so that a distribution under one type of operating condition can be compared directly with distributions observed under other conditions.

The instrumentation included comparable units to distribute fuel consumption; throttle position; and acceleration, positive and negative. The distributing counters thus give four frequency distributions:

1. Percentage of time operated in each speed increment;
2. Percentage of fuel consumed in each speed increment;
3. Percentage of time at each increment of throttle opening; and
4. Percentage of time at each increment of acceleration or deceleration.

Each bank of counters in this instrument is provided with a zeroing device to simplify analysis.

ROUTES

A route intended to be representative of the Los Angeles traffic pattern had been selected beforehand by the Los Angeles Air Pollution Control District. The choice was based on estimates of the proportion of travel on selected streets having a certain range of daily traffic volume. In conference with L. M. Braff, Manager of the Los Angeles City Traffic Department, this route was modified slightly; in this paper it is referred to as Route 1A.

Supplementary tests were made on the following type routes, with the expectation that data could be accumulated by assigning various weightings to results observed on each in proportion to the usage: (a) freeway, (b) surface arterial streets, (c) business section streets, and (d) residential section streets. The current estimate of the distribution of traffic in Los Angeles is freeway, 9 percent; arterial, 60 percent; business section, 18 percent; and residential, 13 percent. With a record of the characteristics of each type, future changes in the proportion of usage can be adjusted by assigning different weightings.

Figure 2 is a map of the Los Angeles area and Figure 3 is a map showing the location of Route 1A. The several routes are described in detail in Appendix I.

TRAFFIC SURVEYS ON ROUTE 1A

The tests covered by this paper were conducted by operating the test car, a 1956 Oldsmobile Super 88, in conjunction with other cars operating on a survey more closely related to the major objective of the AMA Traffic survey Panel. The test car was driven by several people on the Air Pollution Control District staff who had been preselected as representative drivers. The car was driven essentially in conformance with the traffic pattern. Route 1A is a loop running in a generally northwesterly direction from the office of the Los Angeles Air Pollution Control District at 434 South San Pedro Street to the intersection of Van Nuys and Magnolia Boulevards, and returning to the Air Pollution Control District office. The total length of the loop was approximately 50 miles; the outbound portion was 23 miles and the inbound portion 27 miles.

Observations under afternoon peak traffic conditions were made by starting at approximately 4:30 p.m. and driving the outbound route in the direction indicated in Figure 3 to the intersection of Van Nuys and Magnolia. The return side of the loop is driven in an off-peak period.

Morning peak traffic observations were made by starting the test at the inter-

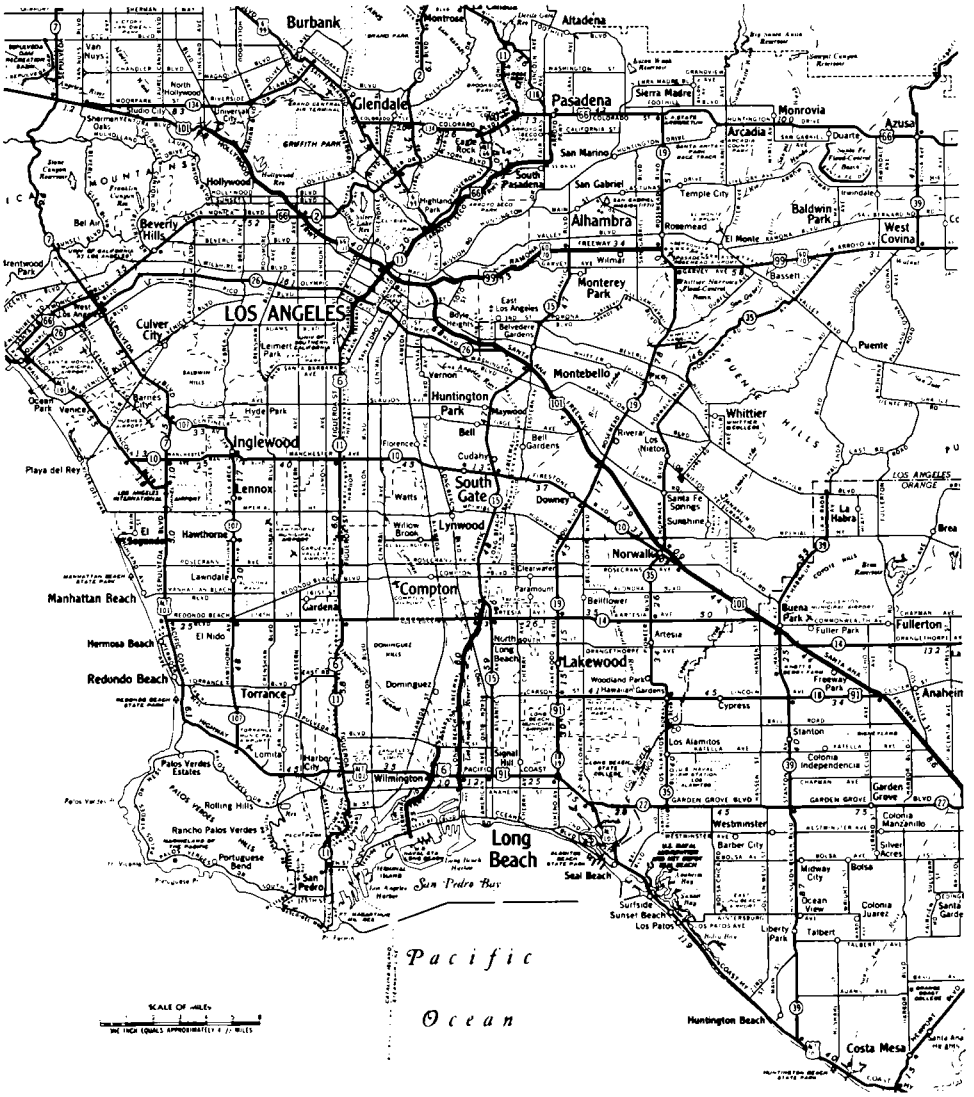

Figure 2. Los Angeles and vicinity.

section of Van Nuys and Magnolia and driving to the Air Pollution Control District office, and the morning off-peak observations were made by returning to the intersection of Van Nuys and Magnolia.

As a matter of practice, counter readings were recorded on each circuit of the route at the Air Pollution Control District office and at the intersection of Van Nuys and Magnolia Boulevards. The operating characteristics of the two portions of this route differed both in the peak and off-peak periods, presumably because of the different geometric design characteristics of the streets in the route.

ANALYSIS OF TEST RESULTS

The analyses were developed on the

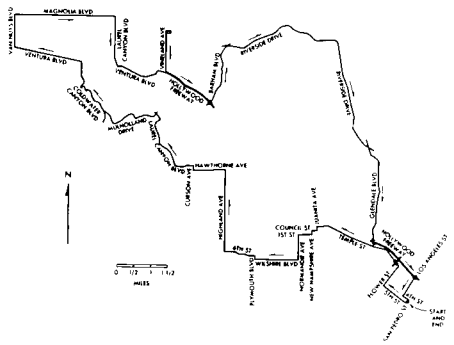

Figure 3. Route 1A.

basis suggested by Figure 4. This is a frequency histogram of the percentage of time spent in each of the increments of speed during a single observation. Test 4B, a morning off-peak run, was selected arbitrarily for this example.

It is impossible to superimpose several frequency histograms without obscuring the meaning, and the histograms were replaced by a curve passing through the middle points of each of the bars.

It is then possible to plot numerous frequency distribution curves for direct comparison as in Figure 5, which shows distribution of percentage of time spent in each of the speed increments for five runs during the off-peak period from the Air Pollution Control District office to the intersection of Van Nuys and Magnolia Boulevards.

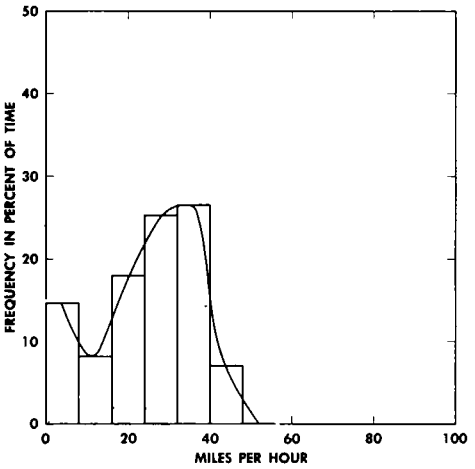

Figure 4. Frequency histogram of percent of time in each speed increment on Route 1A for test 4B.

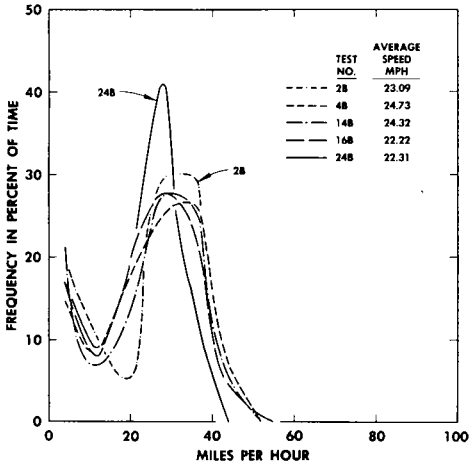

Figure 5. Frequency distribution of percent of time in each speed increment on Route 1A for the morning off-peak runs.

Since the operating characteristics were similar, these distributions should be closely comparable; and, by plotting on this basis, it is possible to segregate and discard those which are abnormal. For example, Test 24B has characteristics considerably different from those of the other runs, and it was discarded. There are minor variations between the remaining tests, which may be explained in part by variations in daily traffic conditions and in part by the difference in driving habits of the individual drivers.

In the analysis of the data, each set of comparable distributions was plotted as in Figure 5 and any abnormal distributions were discarded.

Percentile curves were then constructed by accumulating the percentage in each of the increments of Figure 5, which results in a grouping of curves such as that shown in Figure 6. The curve from Test 24B has been deleted. The percentiles are a closely related group; in the interests of simplification, the speed characteristics under these operating conditions are represented in comparisons to follow by use of the average of the curves.

Figure 7 shows the cumulative percentages of time in each of the incre-

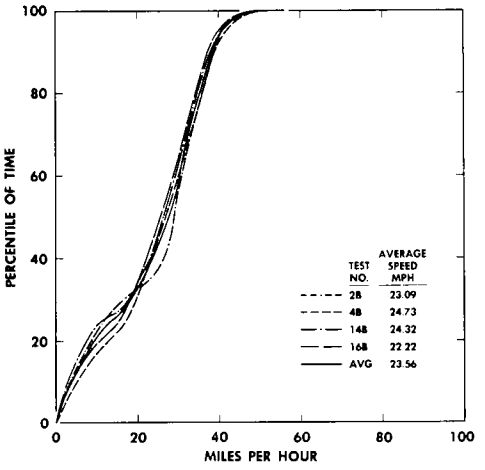

Figure 6. Percentile time distribution in each speed increment on Route 1A for the morning off-peak runs.

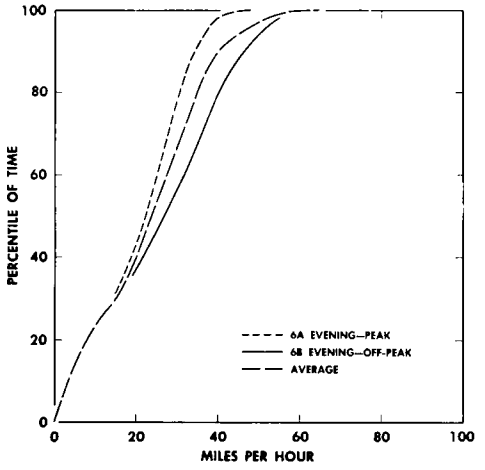

Figure 7. Comparative speed percentile distributions on evening peak and off-peak runs on Route 1A.

ments of speed for both the peak and off-peak portions of Route 1A for one of the evening runs. The curve for the combined total circuit is evidence that the average of the off-peak and peak runs can be used wherever it is desired to show the traffic characteristics of the circuit as a whole.

Test Results — Speed Distributions

The test runs are described in detail in Appendix II, and numerical results are tabulated for each run. Increments into which the ranges of each of four variables were divided are stated.

Figure 8 is a summary of the percentile curves for the several operating conditions on Route 1A. A preliminary round trip curve is shown which includes both parts of the route; it is followed by the average percentile curve of the tests run on peak periods (evening and morning), the off-peak periods (evening and morning), and the outbound and inbound routes at noon, which is an off-peak period.

The curves for the morning peak and the evening off-peak, which are on the inbound route from the intersection of Van Nuys and Magnolia to the Air Pollution Control District office, have generally higher values than the corresponding periods of the outbound route to the intersection of Van Nuys and Magnolia. The average speeds are approximately 5 mph greater, which is attributed to the difference in geometrical design of the streets making up the two parts of the test course. The differences between the two portions of the circuit run at noon are not as large in terms of variation in speed distribution, except in the part of the speed range above 25 mph.

This distinction is real, and it confirms the opinion that there is a significant difference in geometrical design.

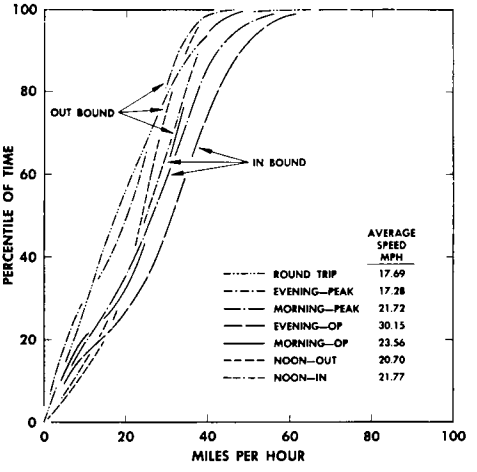

Figure 8. Comparative speed percentile distributions for averages of comparable runs on Route 1A.

Fuel Consumption

The distribution of fuel consumption as a function of speed can be shown for a single test, developed on the same basis as the speed-time distribution of Figure 4. The method for developing the curves shown in Figures 5, 6, and 8 was used in developing Figure 9, which is a comparison of the cumulative percentage of fuel consumption in each increment of speed for the several operating conditions of the two parts of Route 1A. The curves in Figure 9 fall in the same relative position as the corresponding curves in Figure 8. A greater proportion of the fuel was consumed at higher speeds in the off-peak runs and on the inbound portion of the circuit from Van Nuys and Magnolia Boulevard back to the Air Pollution Control District office. The average fuel economy inbound was 14.11 mpg, and outbound, was 10.61 mpg; the average fuel economy for the peak periods was 12.70 mpg and for the off-peak 12.00 mpg, while the average speeds were 19.51 mph and 26.55 mph, respectively.

Throttle Positions

The throttle position indicator was incorporated in the Highway Research Board instruments because this factor would reflect the desire of the driver to accelerate, and because it would measure the relative amount of engine power that the driver would use under various traffic operating conditions.

Figure 10 is a comparison of the frequency in percent of time that the drivers used various increments of throttle opening on four trips on the inbound route. The distribution in Test 8B is highly abnormal, and the distribution in Test 6B deviated somewhat from the other two. At this point, the data from Test 8B were deleted from consideration and the other three runs were retained.

Figure 11 shows the percent of time the throttle was held in each of the increments of opening for the three valid runs retained from Figure 10. The average of the three curves is also shown.

Figure 12 shows the average throttle position percentile curves for the round trip morning and evening peak and off-peak runs and both runs at noon on Route 1A. The differences between the peak and off-peak periods, morning and evening, are not significant. A tendency for slightly less throttle is indicated on the two noon runs.

Acceleration and Deceleration

The acceleration-deceleration instru-

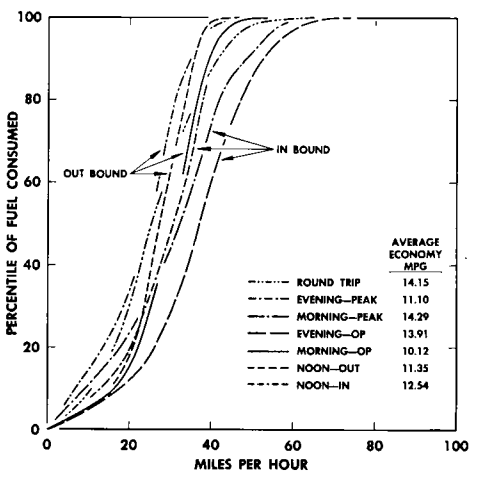

Figure 9. Fuel consumption percentile distributions for averages of comparable runs on Route 1A.

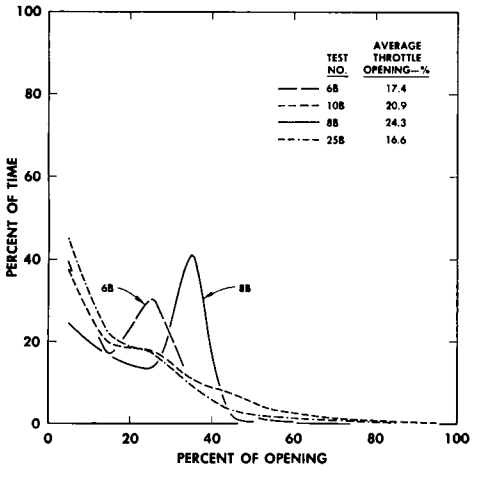

Figure 10. Frequency distribution of percent of time in each increment of throttle position on Route 1A for the evening off-peak runs.

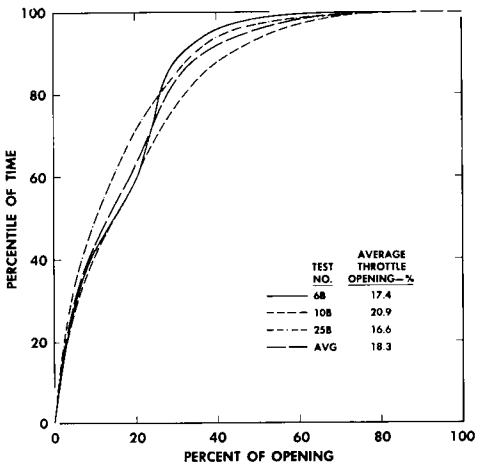

Figure 11. Percentile distribution of time in each increment of throttle positon on Route 1A for the evening off-peak runs.

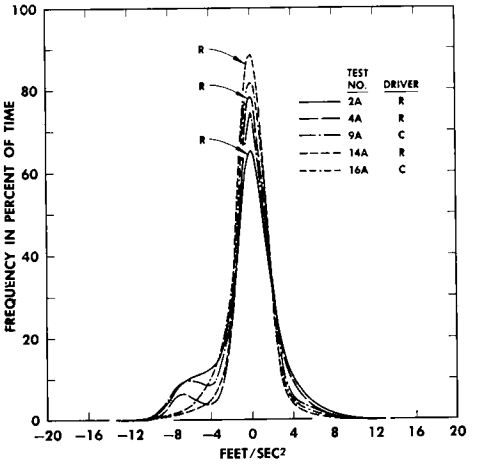

Figure 13. Frequency distribution of percent of time in each increment of acceleration on Route 1A for the morning peak runs.

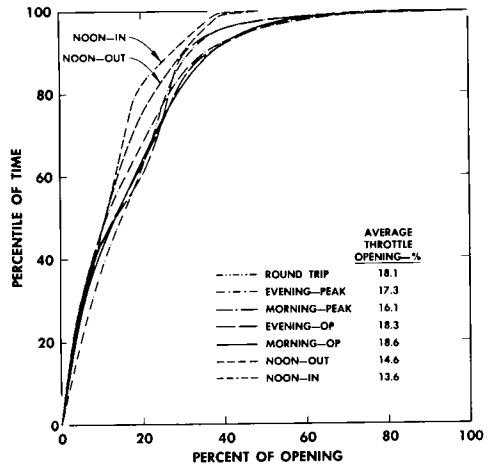

Figure 12. Throttle position percentile distributions for averages of comparable runs on Route 1A.

ment is an inertia type decelerometer with a 0 central position, so that decelerations are indicated on one side of 0 and acceleration on the other.

The frequency curves showing the percentage of time that various increments of acceleration were observed for five runs during the morning peak are shown in Figure 13. The frequency distributions are very closely similar, except that the peaks at 0 acceleration vary from 65 to 89 percent, and that both of the extreme peaks and the middle peak were developed by the same driver, with the other two by another driver occupying second and fourth positions. There is also a variation in position of the curves in the range from 4 to 8 ft of deceleration, and again extreme values are shown by the first driver, who operated three of the five tests. This might indicate that the variation in operation by a single driver may be greater than the difference between two drivers, or that the incidental differences in traffic conditions may exceed variations between drivers.

Figure 14 was developed from Figure 13. The variation between the acceleration-deceleration curves in the series of runs is of small significance.

Figure 15 shows the comparison of the average acceleration-deceleration percentile curves during the several phases and aspects of operation on Route 1A. This chart does not indicate that the variation in acceleration-deceleration is significant over the range of variations encountered.

TYPE ROUTES

Four type routes were suggested by Lloyd Braff, Manager, Traffic Department of the City of Los Angeles, as representative of the operating characteris-

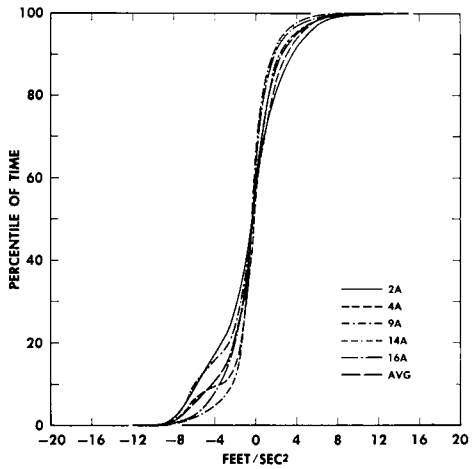

Figure 14. Percentile distribution of time in each increment of acceleration on Route 1A for the morning peak runs.

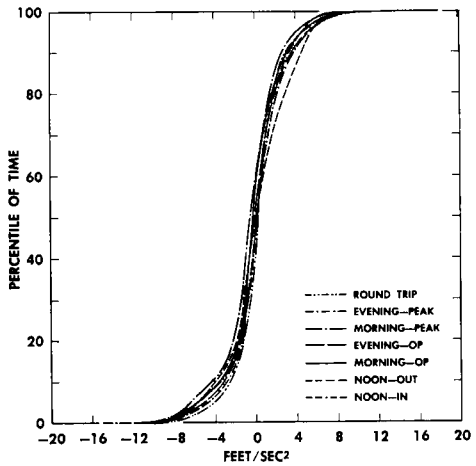

Figure 15. Acceleration percentile distributions for averages of comparable runs on Route 1A.

tics of the Los Angeles traffic: (a) freeway route, (b) surface arterial, (c) business route, and (d) residential route.

The greater part of the street usage in the Los Angeles area is on streets of these four basic types. It may be assumed that, if the operating characteristics on the four basic types are evaluated separately, the results can be combined over an indefinite period of time by weighting each of the four types according to authoritative estimates of the proportion in which it is used.

Figure 16 shows the Hollywood-Santa Ana Freeway from Vineland to Orangethorpe Avenue, a distance of approximately 33 miles.

Figure 17 shows a north-south surface arterial route, starting at the intersection of Figueroa Street and York Boulevard, extending nearly to San Pedro, and returning by a parallel route, a distance of 34 miles southbound and 40 miles northbound.

Figure 18 is an east-west arterial route starting at El Monte, crossing to Santa Monica, and returning by an adjacent parallel route, a distance of 32.5 miles each way.

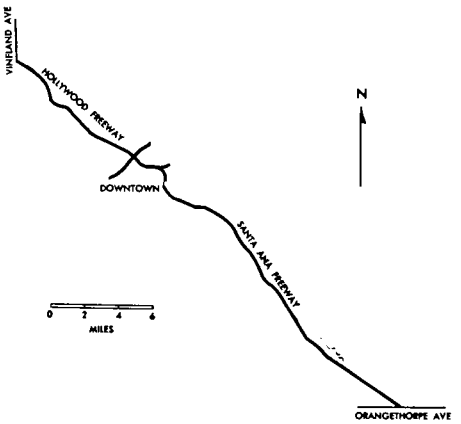

Figure 16. Freeway route in Los Angeles.

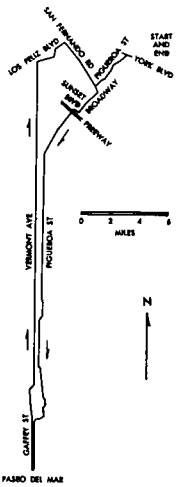

Figure 17. North-south arterial route.

Figure 19 shows a route in the downtown business area operated in the direction indicated; the total length was 14 miles.

Figure 20 shows the route in the residential area starting at the intersection of Edgemont Avenue and Los Feliz Boulevard, traveled as indicated to the terminus at El Centro Avenue and Sunset Boulevard. The total length was 27 miles.

Figure 21 shows the speed percentiles for one peak and two off-peak runs southbound on the north-south surface arterial. The data are limited, but little indication of the effect of traffic density is noted.

Figure 22 is a comparison of the speed percentiles showing the cumulative percent of the time spent at various increments of speed on the average of several

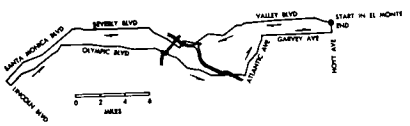

Figure 18. East-west arterial route.

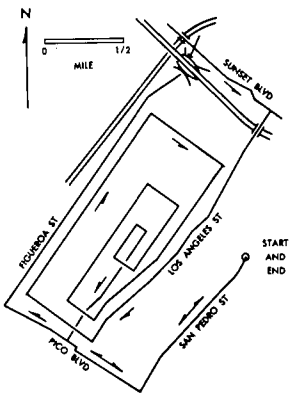

Figure 19. Business route.

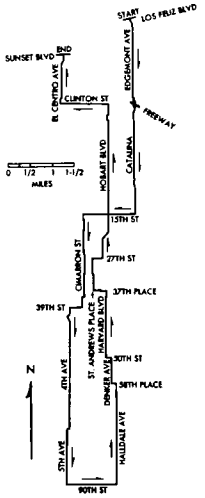

Figure 20. Residential route.

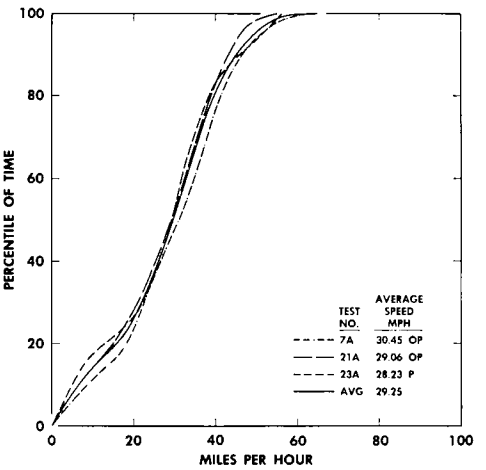

Figure 21. Percentile distribution of speed on the north-south arterial route to San Pedro.

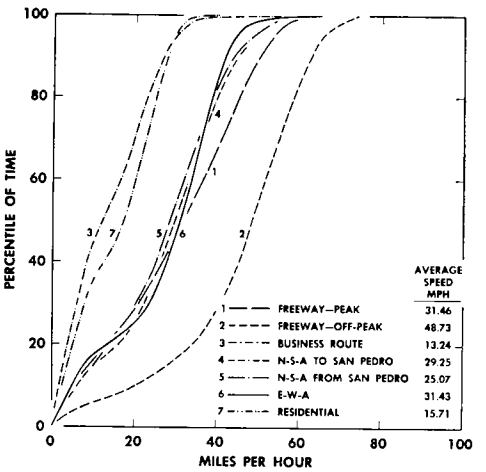

Figure 22. Speed percentile distributions for averages of comparable runs on type routes.

tests on each of these type routes. The speed percentiles in the business and residential routes are closely similar, and both directions of the north-south arterial and the east-west arterial are also closely similar.

A pronounced difference is shown between the speed characteristics on the freeway on the peak and off-peak periods; more significantly, there is little to choose between operating characteristics on the expressway during peak periods and on the surface arterials during either peak or off-peak periods. The average speed on the east-west arterial is 31.4 mph, and on the freeway at peak 31.5 mph.

Figure 23 shows the comparison of fuel consumption distributions on all the type routes.

The fuel consumption characteristics reproduce closely the speed characteristics in Figure 22. The average fuel consumption is as follows:

	mpg
Freeway - off-peak	16.74
Freeway - peak	16.57
N-S Arterial from San Pedro	15.34
N-S Arterial to San Pedro	15.25
E-W Arterial	13.51
Residential	11.74
Business	10.14

Figure 24 shows percentile curves of the time that the throttle is in each increment of the range. The throttle positions during operation on the business route and the off-peak period on the freeway differ, possibly significantly, from throttle positions during the other modes of operation, but there is little distinction between observations under any other conditions or types.

Figure 25 shows the percentile curve of the acceleration and deceleration on the several type routes. Again, the distributions are not different significantly, with the possible exception that they indicate a steeper percentile curve on the

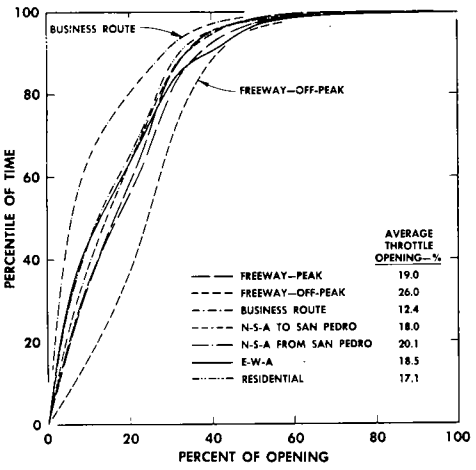

Figure 24. Throttle position percentile distributions for averages of comparable runs on type routes.

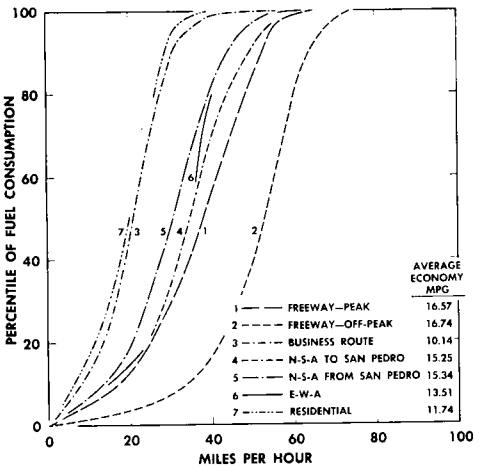

Figure 23. Fuel consumption percentile distributions for averages of comparable runs on type routes.

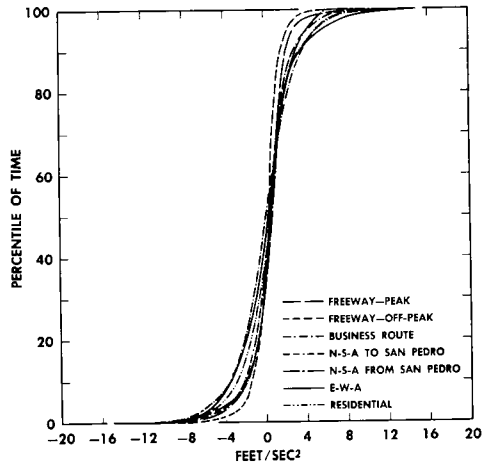

Figure 25. Acceleration percentile distributions for averages of comparable runs on type routes.

freeway both on the peak and off-peak period, which means that there is less percentage of the higher and lower values of acceleration than on other routes.

COMPARISON OF ROUTE 1A AND TYPE ROUTES

The traffic operating characteristics during peak and off-peak periods of the two parts of Route 1A are compared with the characteristics of the type routes in Figure 26 in terms of speed distribution. These are developed by superimposing the curves of Figure 8 and Figure 22; closely similar conditions are averaged. Higher proportions were spent in the lower speed ranges in the residential and business districts, followed by the average of the peak periods of Route 1A. The off-peak periods on Route 1A have essentially the same distribution as surface arterials and the freeway during peak period, but the freeway on the off-peak period has much higher speed. Average speeds are as follows:

	mph
Freeway - off-peak	48.73
Freeway - peak	31.46
E-W Arterial	31.43
N-S Arterial	27.16
Route 1A - off-peak	26.87
Route 1A - peak	19.50
Residential	15.71
Business	13.24

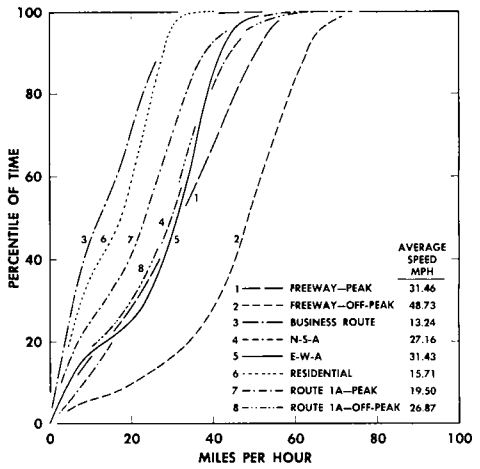

Figure 26. Speed percentile distributions for averages of comparable runs on Route 1A and type routes.

The comparative distributions of the fuel consumption curves are shown in Figure 27. The characteristics of the several street types repeat closely the distinctions in Figure 26, except that the off-peak periods on Route 1A appear to be distinguished slightly more from the peak periods. Slightly larger proportions of fuel were used at slightly higher speeds during peak runs on the freeway. Average fuel economy on the freeway is significantly better than on any other type of street. The chart was constructed by superimposing the characteristic curves of Figure 9 and Figure 23, after averaging conditions which are closely similar.

Figure 28 shows the comparative throttle position on Route 1A under various conditions of operation and on the several type routes. There is little distinction except that a greater proportion of time was spent at lower throttle openings on the business route and a greater proportion of time with wider throttle openings on the off-peak period on the freeway. The remainder of the conditions and routes do not differ significantly.

Figure 29 is a comparison of the averaged percentiles of acceleration and deceleration on Route 1A and on the type routes. This chart is constructed by

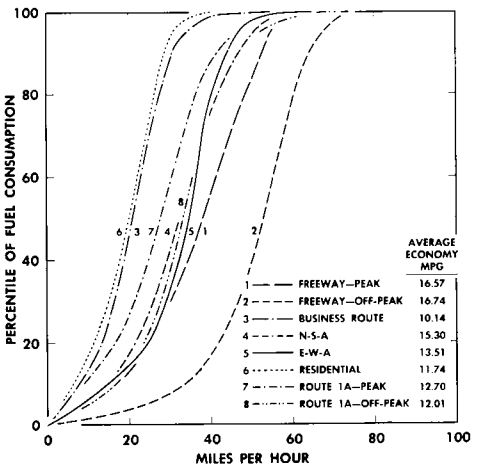

Figure 27. Fuel consumption percentile distributions for averages of comparable runs on Route 1A and type routes.

superimposing curves of Figures 15 and 25, averaging those which are closely similar. There is very little difference between these distributions.

COMPARISON OF LOS ANGELES AND DETROIT STUDIES

Carmichael and Haley (*1*) reported on the development of the statistical instruments and applications of their use to certain parts of the Detroit street system. Some unpublished data from their studies give an interesting comparison, in terms of traffic speed distribution, between some components of the Detroit systems of six years ago and the Los Angeles street system. This gives an opportunity to appraise the technique described here in comparison of street systems in different cities.

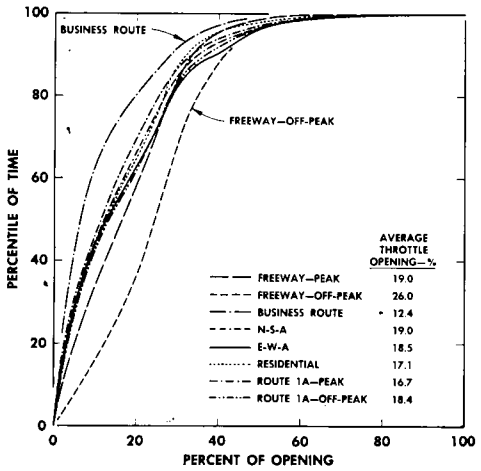

Figure 28. Throttle position percentile distributions for averages of comparable runs on Route 1A and type routes.

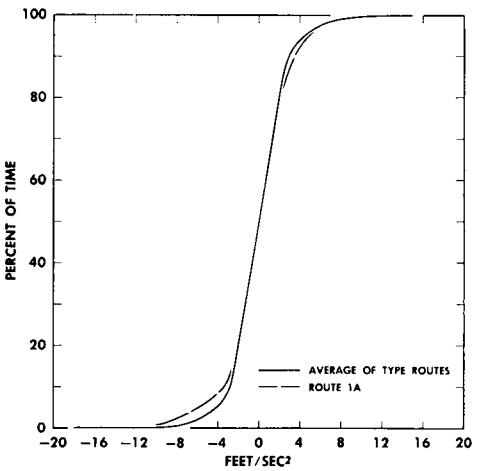

Figure 29. Acceleration percentile distributions for averages of comparable runs on Route 1A and type routes.

Figure 30 is a map of the Detroit street system. The Detroit studies were confined to radial arterials such as Grand River and Woodward; supplementary parallel one-way streets such as 2nd, 3rd, and Brush; and to a cross-town arterial, Vernor. Although functionally some of these streets might be considered comparable with the Los Angeles arterial streets studied, they are, in general, more closely comparable with the Los Angeles business section streets with regard to traffic volumes and physical dimensions. These studies were made nearly six years ago when street cars were still operating, and the results of the Detroit street system are not to be interpreted as reflecting current traffic operation because of changes in signal installations and operation. No observations were made on components of the Detroit system having physical characteristics, signal systems, or speed regulations closely comparable with those of the Los Angeles arterials. The purpose of this section of the paper is not to compare traffic mobility on the Detroit

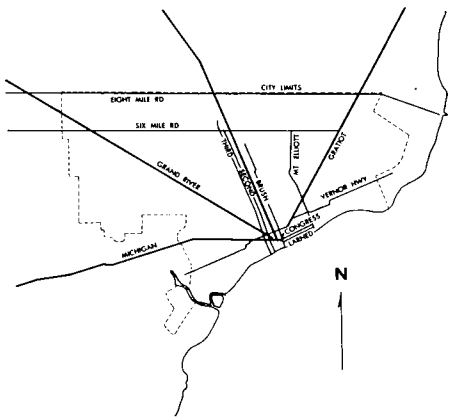

Figure 30. Detroit routes.

and Los Angeles street systems but to show that the technique using the Highway Research Board instruments does appraise relative traffic mobility under different conditions.

Figure 31 shows speed percentile distributions on Grand River Avenue at the morning and evening peaks and at noon. The morning peak gives slightly lower speed than the evening peak during the middle part of the range, and both medians are as much as from 6 to 10 mph slower than the noon traffic median.

Figure 32 is a comparison of the speed distributions on Woodward. The evening peak produces significantly slower speeds than the morning peak, and traffic durthe noon hour moves considerably more rapidly than during either peak.

Figure 33 is a comparable speed distribution on 2nd and 3rd Boulevards; 3rd is inbound one way and 2nd is an adjacent and parallel street, outbound. The physical characteristics are similar over a large part of the distance involved. The evening peak median speed is approximately 8 mph below the morning median and 15 mph below the noon median.

Figure 34 shows the speed distributions on five Detroit streets during the evening peak. Distributions on Grand River, Woodward, 2nd, and Vernor are quite similar, and an average of the four curves can be used to describe these distributions. Brush, which is an outbound one-way street, permits higher speeds below the 50th percentile.

Figure 35 shows a comparison of the speed distributions in Detroit at the evening peak and on the Los Angeles residential, business, and surface arterials. The four Detroit streets are averaged; there is not much difference in traffic flow on these Los Angeles streets between the peak and off-peak periods.

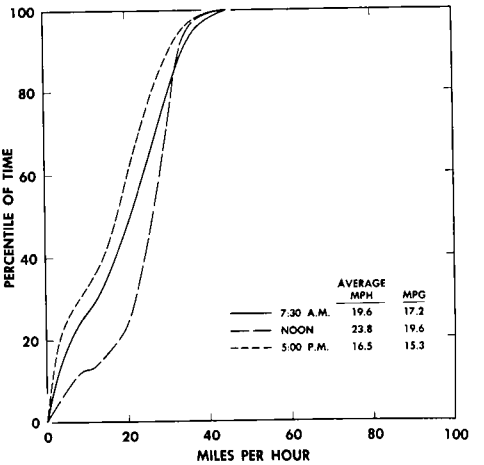

Figure 32. Percentile distributions of speed at different times of day on Woodward.

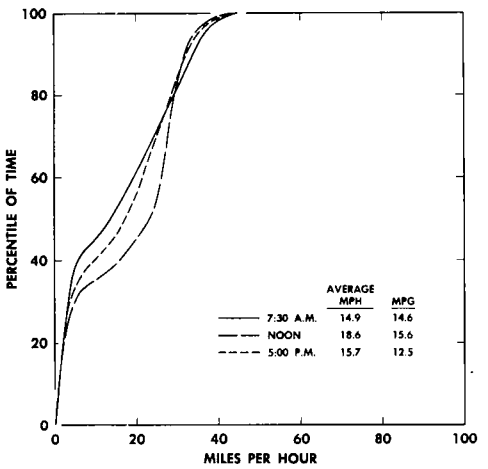

Figure 31. Percentile distributions of speed at different times of day on Grand River.

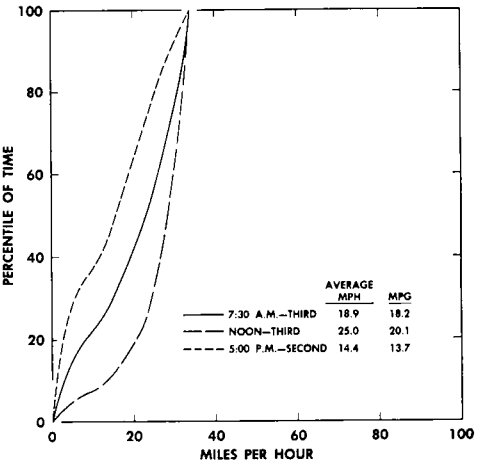

Figure 33. Percentile distributions of speed at different times of day on Second and Third.

The Los Angeles arterials give speeds which are higher throughout the distribution than speeds on the Detroit streets, although the Los Angeles business and residential streets give speeds below the Detroit streets.

Figure 36 is a comparison of the speed distribution in Detroit at the morning peak and the Los Angeles systems. The speed distribution on Grand River is below that of the Los Angeles business area up to the 45th percentile, and the average speed is slightly higher on Woodward and Third.

Woodward and Third have distributions with speeds somewhat above those of the Los Angeles residential district, and the average speed is somewhat higher. However, the speed distribution of the Los Angeles arterials is considerably above that of parts of the Detroit system shown.

Figure 37 is a comparison of the speed

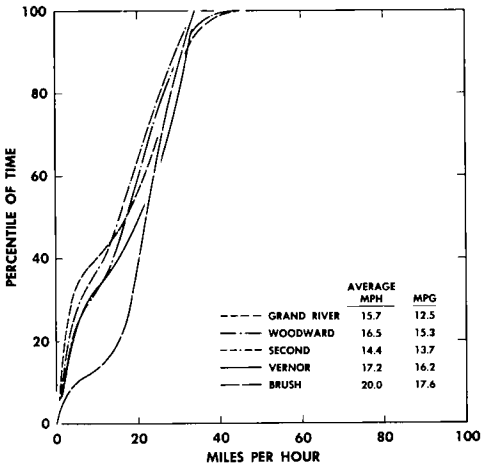

Figure 34. Comparative speed percentile distributions on five Detroit streets at 5:00 p.m.

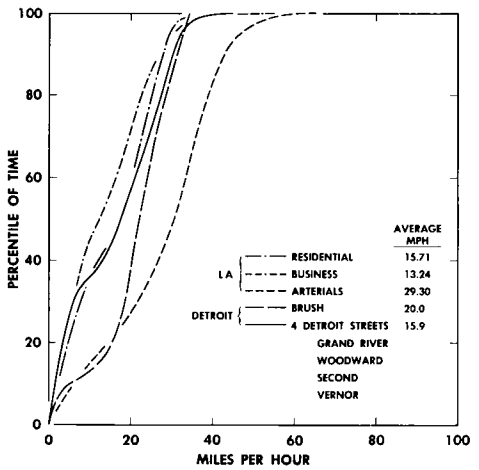

Figure 35. Comparative speed percentile distributions on the residential, business, and arterial routes in Los Angeles and at 5:00 p.m. on Detroit streets.

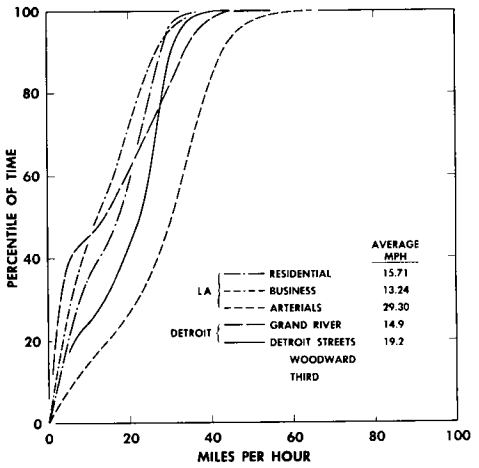

Figure 36. Comparative speed percentile distributions on the residential, business, and arterial routes in Los Angeles and at 7:30 a.m. on Detroit streets.

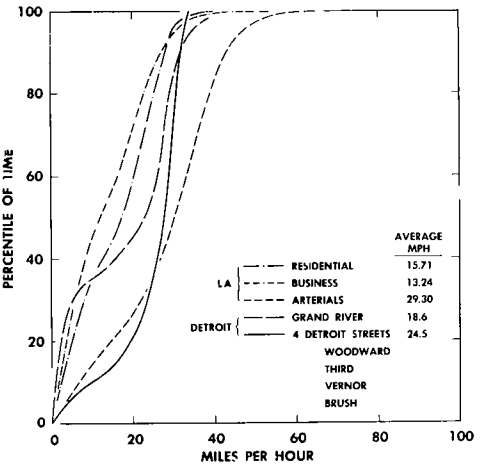

Figure 37. Comparative speed percentile distributions on the residential, business, and arterial routes in Los Angeles and at noon on Detroit streets.

distribution on the Detroit streets at noon and of the Los Angeles street systems.

The average speed on the four Detroit arterials, Woodward, 3rd, Vernor, and Brush, is about 5 mph less than that on the Los Angeles arterials, and the average speed on Grand River is approximately 10 mph less.

The speed percentile distributions characterize the comparative mobility of traffic on the Los Angeles and Detroit components studied in a manner which is consistent with subjective impressions, or recollections of impressions, of five years ago of Detroit. This technique can be used universally to characterize and measure traffic mobility.

Distributions of fuel consumption are not shown here for the Detroit street system, because, in general, these distributions have the same relative positions as speed distributions. Comparisons of average fuel economy on Los Angeles and Detroit streets cannot be made because the cars used were of different makes and sizes. Comparable throttle position and acceleration data are not available in the Detroit study.

SUMMARY

These data indicate that statistical instruments of the Highway Research Board type can be used to characterize traffic flow characteristics of various city operating conditions in a manner consistent with the subjective reactions of experienced drivers.

The speed distributions are the most sensitive indices of traffic flow characteristics, followed by distributions of fuel consumption, throttle opening, and acceleration. Measurements of acceleration are so insensitive to traffic conditions and street types as to be of negligible value.

The speed distributions, in particular, are sensitive enough to show distinction between the geometrical design characteristics of the outbound and inbound portions of the representative Route 1A in Los Angeles.

The similarity of the speed distributions on Route 1A and the surface arterials verifies the choice of Route 1A as typifying Los Angeles traffic conditions.

The speed distributions show that the peak and off-peak travel characteristics on the north-and-southbound surface arterial streets in Los Angeles are very nearly similar, and that the operating characteristics on the north-and-southbound arterials were practically identical to those of the east-westbound arterial.

The speed distributions on the Los Angeles freeway during peak periods are essentially similar to those of the surface arterial streets; the fuel economy is significantly better on the freeway.

The speed and fuel consumption characteristics as measured by these instruments are significant indices of operating characteristics, and changes in characteristics, developing over a period of years from increased traffic volumes or modifications of geometrical design, would be reflected by changes in the characteristic curves.

The speed and fuel consumption distributions are identified with the traffic flow characteristics sufficiently well that the relative flow characteristics on different streets in the same city or in different cities can be appraised. In particular, the superior mobility of traffic flow on Los Angeles surface arterial streets with respect to business and residential streets is demonstrated clearly, with components of the Detroit system having mixed business and arterial functions falling between.

ACKNOWLEDGMENTS

The cooperation of S. Smith Griswold and Wallace Linville and their staff of the Los Angeles Air Pollution Control District, and the interest and guidance of Lloyd Braff, Manager, Los Angeles Traffic Department, made this study possible. The interest and support of D. M. Teague, chairman, and of the other members of the Traffic Survey Panel of the Automobile Manufacturers Association are also acknowledged gratefully.

REFERENCE

1. CARMICHAEL, T. J. AND HALEY, C. E., "A Study of Vehicle, Roadway, and Traffic Relationships by Means of Statistical Instruments." Highway Research Board, *Proceedings*, Vol. 30 (1950).

APPENDIX I

SUMMARY OF TYPE ROUTES IN LOS ANGELES

1. *Freeway* — Start at Vineland Avenue and follow Hollywood and Santa Ana Freeways to Orangethorpe Avenue; return via reverse route.
2. *East-West Arterial* — Start at Valley Boulevard and Hoyt Avenue in El Monte and proceed west on Valley Boulevard, Mission Road, Macy Street, Main Street, 2nd Street, Beverly Boulevard, and Santa Monica Boulevard to Lincoln Boulevard, thence south on Lincoln Boulevard to Olympic Boulevard, and east on Olympic Boulevard to Atlantic Avenue, thence north on Atlantic Avenue to Garvey Avenue and east on Garvey Avenue to Hoyt Avenue, thence north on Hoyt Avenue to start.
3. *North-South Arterial* — Start at Figueroa Street and York Boulevard and proceed southerly on Figueroa Street, San Fernando Road, Broadway, Sunset Boulevard (westerly), Figueroa Street, and Wilmington and San Pedro Road to Paseo Del Mar, westerly on Paseo Del Mar to Gaffey Street, thence northerly on Gaffey Street and Vermont Avenue to Los Feliz Boulevard, easterly on Los Feliz Boulevard to San Fernando Road; return via reverse route.
4. *Residential* — Start at Edgemont Avenue and Los Feliz Boulevard and proceed in a southerly direction on Edgemont Avenue, Melrose Avenue, Heliotrope Drive, Beverly Boulevard, Catalina Street, 15th Street (westerly), Van Ness Avenue, Cimarron Street, 39th Street (westerly), Roxton Avenue, 4th Avenue, 5th Avenue, 90th Street (easterly) to Halldale Avenue, thence northerly on Halldale Avenue, 58th Place, Denker Avenue, 50th Street, Harvard Boulevard, 37th Place (westerly), St. Andrews Place, 27th Street (easterly), Hobart Boulevard, Clinton Street (westerly), Lucerne Boulevard, and El Centro to Sunset.
5. *Business* — Start at 434 S. San Pedro St., south to Pico Boulevard, proceed in a loop on Pico Boulevard, Figueroa Street, Sunset Boulevard, Los Angeles Street, 12th Street, Flower Street, 1st Street, Main Street, 11th Street, Olive Street, 4th Street, Spring Street, 8th Street, Hill Street, 6th Street, Broadway and Pico Blvd. to start.

MODIFIED AUTOMOTIVE TESTING ROUTE

Route 1A

Commencing at Fifth Street and San Pedro Street
West on Fifth Street to Flower Street
North on Flower Street to Temple Street
West on Temple Street to Silver Lake Boulevard
West on Silver Lake Boulevard to Juanita Avenue
South on Juanita Avenue to Council Street
West on Council Street to New Hampshire Avenue
South on New Hampshire to 1st Street
West on 1st Street to Normandie Avenue
South on Normandie Avenue to Wilshire Boulevard
West on Wilshire Boulevard to Plymouth Boulevard
North on Plymouth Boulevard to Sixth Street
West on Sixth Street to Highland Avenue
North on Highland Avenue to Hawthorn Avenue
West on Hawthorn Avenue to Curson Avenue
North on Curson Avenue to Hollywood Boulevard
West on Hollywood Boulevard to Laurel Canyon Blvd.
North on Laurel Canyon Boulevard to Mulholland Drive
West on Mulholland Drive to Coldwater Canyon Blvd.
North on Coldwater Canyon Boulevard to Ventura Blvd.
West on Ventura Boulevard to Van Nuys Boulevard
North on Van Nuys Boulevard to Magnolia Boulevard
East on Magnolia Boulevard to Laurel Canyon Boulevard
South on Laurel Canyon Blvd. to Ventura Boulevard
East on Ventura Blvd. to Vineland Avenue
North on Vineland Avenue to Peach Grove Street
East on Peach Grove Street to Cleon Avenue
South on Cleon Avenue to Camarillo Street
West on Camarillo Street to Vineland Avenue

South on Vineland Avenue to Cahuenga Freeway
East on Cahuenga Freeway to Barham Boulevard
North on Barham Boulevard to Riverside Drive
East and South on Riverside Drive to Glendale Blvd.
South on Glendale Boulevard to Hollywood Freeway
East on Hollywood Freeway to Los Angeles Street
South on Los Angeles Street to Fourth Street
East on Fourth Street to San Pedro Street
South on San Pedro Street to Garage

East-West Arterial

Start at Valley Boulevard and Hoyt Avenue in El Monte
West on Valley Boulevard and Mission Road to Macy Street
West on Macy Street to Main Street
South on Main Street to 2nd Street
West on 2nd Street and Beverly Boulevard to Santa Monica Boulevard
West on Santa Monica Boulevard to Lincoln Boulevard
South on Lincoln Boulevard to Olympic Boulevard
East on Olympic Boulevard to Atlantic Avenue
North on Atlantic Avenue to Garvey Avenue
East on Garvey Avenue to Hoyt Avenue
North on Hoyt Avenue to Valley Boulevard and end of route

North-South Arterial

North-South Arterial Automotive Testing Route
Start at Figueroa Street and York Boulevard
South on Figueroa Street to San Fernando Road
East on San Fernando Road to Broadway
South on Broadway to Sunset Boulevard
West on Sunset Boulevard to Figueroa Street
South on Figueroa Street to Wilmington and San Pedro Road
South on Wilmington and San Pedro Road and Pacific Avenue to Paseo Del Mar (Intermediate Point)
West on Paseo Del Mar to Gaffey Street
North on Gaffey Street and Vermont Avenue to Los Feliz Boulevard
East and North on Los Feliz Boulevard to San Fernando Road
East on San Fernando Road to Figueroa Street
North on Figueroa Street to York Street and end of route

Freeway Automotive Testing Route
Start at Vineland Avenue and Hollywood Freeway
Southeast on the Hollywood Freeway and the Santa Ana Freeway to Orangethorpe Avenue
Northwest on the Santa Ana Freeway and the Hollywood Freeway to the end of the route at Vineland Avenue

Residential Route

Start at the intersection of Los Feliz Boulevard and Edgemont Avenue in Hollywood
South on Edgemont Avenue to Melrose Avenue
East on Melrose Avenue to Heliotrope Drive
South on Heliotrope Drive to Rosewood Avenue
West on Rosewood Avenue to Heliotrope Drive
South on Heliotrope Drive to Beverly Boulevard
East on Beverly Boulevard to Catalina Street
South on Catalina Street to San Marino Street
East on San Marino Street to Catalina Street
South on Catalina Street to 15th Street
West on 15th Street to Van Ness Avenue
South on Van Ness Avenue to Venice Boulevard
East on Venice Boulevard to Cimarron Street
South on Cimarron Street to Jefferson Boulevard
West on Jefferson Boulevard to Cimarron Street
South on Cimarron Street to Exposition Place
East on Exposition Boulevard to first streetcar track crossover
South across streetcar tracks to Rodeo Road
West on Rodeo Road to Cimarron Street
South on Cimarron Street to 39th Street
West on 39th Street to Roxton Avenue
South on Roxton Avenue and 4th Avenue to Florence Avenue
West on Florence Avenue to 5th Avenue
South on 5th Avenue to 90th Street
East on 90th Street to Halldale Avenue
North on Halldale Avenue to 58th Place
West on 58th Place to Denker Avenue
North on Denker Avenue to 50th Street
West on 50th Street to Harvard Boulevard
North on Harvard Boulevard to Exposition Boulevard
East on Exposition Boulevard to first streetcar track crossover
North across streetcar tracks to Exposition Place
West on Exposition Place to St. Andrews Place

North on St. Andrews Place to 27th Street
East on 27th Street to Hobart Boulevard
North on Hobart Boulevard to Washington Boulevard
East on Washington Boulevard to Hobart Boulevard
North on Hobart Boulevard to Beverly Boulevard
West on Beverly Boulevard to Hobart Boulevard
North on Hobart Boulevard to Oakwood Avenue
East on Oakwood Avenue to Hobart Boulevard
North on Hobart Boulevard to Clinton Street
West on Clinton Street to Lucerne Boulevard
North on Lucerne Boulevard to Melrose Avenue
East on Melrose Avenue to El Centro Avenue
North on El Centro Avenue to Sunset Boulevard and end of route

Business Route

Start at 434 San Pedro Street
South on San Pedro Street to Pico Boulevard
West on Pico Boulevard to Figueroa Street
North on Figueroa Street to Sunset Boulevard
East on Sunset Boulevard to Los Angeles Street
South on Los Angeles Street to 12th Street
West on 12th Street to Flower Street
North on Flower Street to First Street
East on First Street to Main Street
South on Main Street to 11th Street
West on 11th Street to Olive Street
North on Olive Street to 4th Street
East on 4th Street to Spring Street
South on Spring Street to 8th Street
West on 8th Street to Hill Street
East on 6th Street to San Pedro Street
North on San Pedro Street to Garage at 434 San Pedro Street and end of route

Off-peak driving: When this route is driven in off-peak hours drive twice around the course recording data at the start and end of the entire drive.

Evening peak driving:

Business route, garage (intermediate point), north on San Pedro Street, west on Market Street, North on Los Angeles Street, northwest on the Hollywood Freeway to Vineland Avenue and end of route

or:

Business route, garage (intermediate point), north on San Pedro Street, east on 4th Street, southeast on the Santa Ana Freeway to Orangethorpe Avenue and the end of the route

Morning peak driving:

Starting at Vineland Avenue, southeast on the Hollywood Freeway to Los Angeles Street, south on Los Angeles Street, east on Commercial Street, south on San Pedro Street to Garage (intermediate point), business route

or:

Starting at Orangethorpe Avenue, northwest on the Santa Ana Freeway to 4th Street, west on 4th Street to San Pedro Street, south on San Pedro to Garage (intermediate point), business route.

APPENDIX II

TABLE 1
SPEED, IN PERCENT

	Speed Range mph	Van Nuys and Magnolia to 434 S. San Pedro Morning - Peak 2A	4A	9A	14A	16A	24A	Avg	434 S. San Pedro to Van Nuys and Magnolia Evening - Peak 6A	8A	10A	25A	Avg	Avg. Morn. and Even. P.
1	0- 8	7.67	16.88	-	23.72	17.42	0.63	16.42	18.86	36.78	27.87	32.66	26.46	21.44
2	9-16	12.62	11.35		10.97	9.25	0.42	11.05	14.12	0.21	12.87	11.70	12.90	11.98
3	17-24	20.60	15.91		12.33	16.57	0.08	16.35	23.01	21.94	22.54	20.37	21.97	19.16
4	25-32	21.30	17.78		19.78	23.96	46.11	20.71	28.78	26.26	25.98	25.27	26.68	23.70
5	33-40	24.16	21.29		19.15	23.77	37.80	22.09	14.10	13.55	9.62	9.05	10.92	16.51
6	41-48	10.50	11.08		8.55	4.84	14.43	8.74	1.13	1.26	1.12	0.95	1.07	4.90
7	49-56	3.15	5.49		5.20	2.21	1.04	4.01						2.00
8	57-65	0.00	0.22		0.30	1.91		.61						0.30
9	66-74	0.00	0.00		0.00	0.07		.02						0.01
10	75 and up													
Driver		Ridderhoff	Ridderhoff	Conrow	Ridderhoff	Conrow	Salinger		Conrow	Bishop	Conrow	Conrow		
Date		5-3-56	5-4-56	5-8-56	5-10-56	5-11-56	5-17-56		5-4-56	5-7-56	5-8-56	5-17-56		
Master Counter		4679	4714	4272	4040	2239	3241		5223	4966	4546	4868		
Trip Mileage		28.4	26.5	27	26.3	26	26.4		24	24	23	23		
Hours		1.30	1.31		1.12	1.22	0.90		1.45	1.38	1.26	1.35		
MPH		21.85	20.23		23.48	21.31	29.33	21.72	16.55	17.39	18.25	17.04	17.28	19.50

	Speed Range mph	Van Nuys and Magnolia to 434 S. San Pedro Evening - OP 6B	8B	10B	25B	Avg	434 S. San Pedro to Van Nuys and Magnolia Morning - OP 2B	4B	14B	16B	24B	Avg	Avg. Morn. and Even. OP
1	0- 8	21.31	12.43	13.30	10.12	14.29	19.56	14.73	21.12	17.12	17.12	18.13	16.21
2	9-16	8.83	9.15	6.62	5.56	7.54	10.22	8.26	6.85	7.98	8.82	8.33	7.94
3	17-24	14.12	12.71	8.36	9.02	11.05	5.42	18.01	13.47	19.76	19.32	14.17	12.61
4	25-32	16.58	15.67	20.04	21.44	18.43	29.98	25.35	27.72	27.90	41.06	27.74	23.09
5	33-40	20.16	25.28	22.87	25.35	23.42	29.71	26.56	25.52	22.36	13.68	26.04	24.73
6	41-48	10.61	16.39	16.75	18.00	15.44	5.11	7.09	5.27	4.34		5.45	10.44
7	49-56	7.06	6.33	6.31	8.34	7.01	0.00	0.00	0.05	0.54		.14	3.58
8	57-65	1.33	1.96	4.82	2.17	2.57							1.28
9	66-74	0.00	0.08	0.93	0.00	.25							0.12
10	75 and up												
Driver		Conrow	Bishop	Conrow	Conrow		Ridderhoff	Ridderhoff	Ridderhoff	Conrow	Salinger		
Date		5-4-56	5-7-56	5-8-56	5-17-56		5-3-56	5-4-56	5-10-56	5-11-56	5-17-56		
Master Counter		3844	3325	3052	2948		4424	3365	3415	2729	3760		
Trip Mileage		27	28	27	27		28.4	23.0	23.1	24.0	23.2		
Hours		1.06	0.92	0.85	0.82		1.23	0.93	0.95	1.08	1.04		
MPH		25.47	30.43	31.76	32.93	30.15	23.09	24.73	24.32	22.22	22.31	23.59	

TABLE 2
SPEED, IN PERCENT

	Speed Range mph	Round Trip Evening 1 OP	434 S. San Pedro to V. N. and M. Noon - OP 3A	5A	Avg	V. N. and M. to S. San Pedro Noon - OP 3B	5B	Avg
1	0- 8	21.52	2.39	16.27	9.33	2.58	20.79	11.68
2	9-16	24.63	15.59	10.44	13.01	15.79	10.58	13.18
3	17-24	19.20	32.39	24.04	28.22	27.04	17.04	22.04
4	25-32	18.07	33.72	30.94	32.33	27.11	22.34	24.72
5	33-40	10.45	14.92	17.43	16.18	25.72	19.51	22.62
6	41-48	5.23	0.99	0.88	.93	1.76	8.15	4.96
7	49-56	0.71				0.00	1.59	.80
8	57-65	0.19						
9	66-74							
10	75 and up							
Driver		Bishop	Jan Dickenson			Jan Dickenson		
Date		5-2-56	5-3-56	5-4-56		5-3-56	5-4-56	
Master Counter		7712	5254	3912		1638	4201	
Trip Mileage		46	28.3	24		9.5	26.8	
Hours		2.6	1.46	1.09		0.46	1.17	
MPH		17.69	19.38	22.02	20.70	20.65	22.90	21.77

	Speed Range mph	Residential Noon 17 P	1:50-3:00 22 P	2:40-3:30 20 OP	Avg	Business Route (Begin and End at 434 S. San Pedro) Morning 11B P	27 P	Noon 12 P	28 P	Evening 18A P	Avg
1	0- 8	23.51	38.58	24.95	31.04	37.47	37.87	37.19	40.90	43.73	39.43
2	9-16	14.89	16.78	9.74	15.84	16.62	17.65	21.55	20.65	18.40	18.97
3	17-24	32.88	25.32	13.20	29.10	25.28	27.44	25.79	24.91	20.16	24.72
4	25-32	27.99	17.60	24.73	22.80	15.66	14.45	12.99	12.15	15.02	14.05
5	33-40	0.73	1.72	22.49	1.22	4.92	1.51	2.48	1.39	2.55	2.57
6	41-48			4.57		0.05	0.95	0	0	0.14	.23
7	49-56			0.32		0	0.13	0	0	0	.03
8	57-65										
9	66-74										
10	75 and up										
Driver		Anne Polim	Conrow	Parmalee		Ridderhoff	Conrow	Anne Polim	Salinger	Ridderhoff	
Date		5-11-56	5-16-56	5-12-56		5-9-56	5-18-56	5-9-56	5-18-56	5-11-56	
Master Counter		5415	2532	2617		3522	3640	7406	3968	3968	
Trip Mileage		26.8	9.5	16.7		13.8	14	27.1	13.8	13.8	
Hours		1.50	0.70	0.73		0.98	1.01	2.06	1.10	1.10	
MPH		17.86	13.57	22.88	15.71	14.08	13.86	13.16	12.54	12.54	13.24

TABLE 3
SPEED, IN PERCENT

Freeway

	Speed Range mph	Morning: Vineland and Freeway to 434 S. San Ped. 11A	Morning: Same 26	Evening: 13	Evening: To Orangethorpe 15A	Evening: Hollywood S.S.P. to Vent. and Vine. 18B	Evening: Orangethorpe to Vineland 15B OP	Noon S.S.P. to Vine. to Orangethorpe and Back 29 OP	Total Avg	Avg 11A, 13, 18B, 26, 15A	Avg 15B, 29
			7:10-7:33	4:50-5:35	4:40-5:30	6:20-6:45	5:50-6:33	1:07-2:40			
1	0- 8	15.76	13.55	15.15	12.04	13.95	2.45	7.88	11.54	14.09	5.16
2	9-16	6.41	7.38	10.57	10.26	7.95	1.78	3.49	6.83	8.51	2.64
3	17-24	12.62	7.53	15.71	9.85	14.96	3.48	5.42	9.94	12.13	4.45
4	25-32	17.33	8.45	19.47	14.06	19.36	5.34	5.42	12.78	15.74	5.38
5	33-40	26.82	23.82	12.24	9.54	14.23	14.05	7.71	15.49	17.33	10.88
6	41-48	11.38	27.09	13.76	25.68	11.35	24.77	15.16	18.46	17.85	19.96
7	49-56	6.54	11.95	11.71	17.10	14.23	19.98	30.78	16.04	12.31	25.38
8	57-65	3.14	0.23	1.39	1.47	3.97	17.86	24.05	7.44	2.04	20.96
9	66-74	0	0	0	0	0	10.29	0.09	1.48		5.19
10	75 and up										
Driver		Ridderhoff	Conrow	Bishop	Conrow	Ridderhoff	Conrow	Salinger			
Date		5-9-56	5-18-56	5-9-56	5-10-56	5-11-56	5-10-56	5-18-56			
Master Counter		1440	1268	2834	2605	1267	2241	5522			
Trip Mileage		11.5	11	22	26	11.6	33	67.7 Round Trip			
Hours		0.40	0.35	0.79	0.72	0.35	0.62	1.53			
MPH		28.75	31.43	27.85	36.11	33.14	53.22	44.25		31.46	48.73

	Speed Range mph	E-W-A (Mid-Morn) To Santa Monica 19A OP	E-W-A (Mid-Morn) From Santa Monica 19B OP	E-W-A (Mid-Morn) Avg	N-S-A To San Pedro 10:02-11:15 7A OP	N-S-A To San Pedro 1:16-2:30 21A OP	N-S-A To San Pedro 5:15-6:17 23A P	N-S-A To San Pedro Avg	N-S-A From San Pedro 11:45-1:20 7B OP	N-S-A From San Pedro 2:45-4:20 21B OP	N-S-A From San Pedro 6:25- 7:20 7:40- 8:10 10:19-10:54 23B OP	N-S-A From San Pedro Avg	Avg. of Avgs. To and From S.P.
1	0- 8	18.56	13.06	15.81	9.76	11.80	16.19	12.58	5.89	14.70	14.83	11.81	12.20
2	9-16	4.84	6.58	5.71	7.13	9.31	5.57	7.34	15.79	11.55	6.40	11.25	9.30
3	17-24	6.46	11.82	9.14	16.60	16.09	11.68	14.79	6.34	21.40	14.65	14.13	14.46
4	25-32	19.67	25.69	22.68	19.21	22.09	27.66	22.99	24.85	21.10	23.03	22.99	22.99
5	33-40	32.90	30.96	31.93	24.99	23.55	21.96	23.50	23.78	18.10	26.83	22.90	23.20
6	41-48	15.81	9.77	12.79	15.01	14.52	8.82	12.78	13.49	8.78	12.06	11.44	12.11
7	49-56	1.64	1.59	1.62	5.57	2.64	8.12	5.44	8.03	4.37	2.20	4.87	5.15
8	57-65	0.12	0.53	.32	1.73	0	0	.58	1.83	0	0	.61	0.59
9	66-74												
10	75 and up												
Driver		Parmalee	Parmalee		Salinger	Conrow	Salinger		Salinger	Conrow	Salinger		
Date		5-12-56	5-12-56		5-5-56	5-14-56	5-16-56		5-5-56	5-14-56	5-16-56		
Master Counter		4049	3456		4045	4222	3453		5842	5603	6266		
Trip Mileage		32.5	32.5		34.1	34	27.1		34.4	40	49.3		
Hours		1.12	0.96		1.12	1.17	0.96		1.62	1.56	1.74		
MPH		29.02	33.85	31.43	30.45	29.06	28.23	29.25	21.23	25.64	28.33	25.07	27.16

TABLE 4
FUEL, IN PERCENT

	Speed Range MPH	Van Nuys and Magnolia to 434 S. San Pedro Morning - Peak 2A	4A	9A	14A	16A	24A	Avg.	434 S. San Pedro to Van Nuys and Magnolia Evening - Peak 6A	8A	10A	25A	Avg.	M and E Peak Avg.
1	0- 8	7.30	9.88	-	6.74	9.75	0.42	6.70	10.50	19.70	7.79	7.58	11.39	9.04
2	9-16	4.48	8.39		8.46	8.44	4.30	7.40	10.39	13.14	12.73	11.70	11.99	9.70
3	17-24	9.52	13.29		12.69	12.83	21.16	14.99	20.73	22.88	24.04	24.44	23.02	19.00
4	25-32	11.35	15.13		22.27	17.78	28.33	20.88	33.23	26.06	36.90	38.89	33.77	27.32
5	33-40	20.66	23.18		27.56	30.48	30.27	27.87	22.61	16.84	16.10	14.97	17.63	22.75
6	41-48	25.95	18.41		12.49	10.02	14.17	13.77	2.54	1.38	2.44	2.42	2.20	8.00
7	49-56	20.74	11.52		9.13	4.80	1.35	6.70						3.35
8	57-65		0.20		0.66	4.87		1.43						0.71
9	66-74					1.03		0.26						0.13
10	75 and up													
Driver		Ridderhoff	Ridderhoff	Conrow	Ridderhoff	Conrow	Salinger		Conrow	Bishop	Conrow	Conrow		
Date		5-3-56	5-4-56	5-8-56	5-10-56	5-11-56	5-17-56		5-4-56	5-7-56	5-8-56	5-17-56		
Total Count		4536	1467		1513	1457	1186		1809	944	1477	1530		
Total Gallons		5.99	1.94		2.00	1.92	1.57		2.39	1.25	1.95	2.02		
Miles		28.4	26.5		26.3	26	26.4		24	14	23	23.0		
MPG		4.74	13.66		13.15	13.54	16.81	14.29	10.04	11.20	11.79	11.39	11.10	12.70

	Speed Range MPH	Van Nuys and Magnolia to 434 S. San Pedro Evening - Off Peak 6B	8B	10B	25B	Avg.	434 S. San Pedro to Van Nuys and Magnolia Morning - Off Peak 2B	4B	14B	16B	24B	Avg.	Avg. 2B, 4B, 14B, 16B	M and E-OP Avg.
1	0- 8	4.36	-	3.59	2.27	3.41	1.50	3.39	5.61	6.17	4.45	4.22	4.17	3.79
2	9-16	6.30		5.46	4.98	5.58	3.77	4.26	4.40	8.02	7.10	5.51	5.11	5.35
3	17-24	9.48		6.54	6.74	7.59	18.46	13.84	12.31	17.51	17.19	15.86	15.53	11.56
4	25-32	15.54		17.40	17.94	16.96	35.60	24.95	32.46	29.85	52.97	35.15	30.72	23.84
5	33-40	29.18		26.10	26.28	27.18	36.49	40.32	37.69	30.05	18.39	32.59	36.14	31.66
6	41-48	17.95		21.85	25.62	21.81	4.18	13.24	7.27	7.32		6.40	8.00	14.90
7	49-56	13.54		8.13	12.66	11.44			0.26	1.08		0.27	0.33	5.88
8	57-65	3.65		8.77	3.51	5.31								2.66
9	66-74			2.16		0.72								0.36
10	75 and up													
Driver		Conrow	Bishop	Conrow	Conrow		Ridderhoff	Ridderhoff	Ridderhoff	Conrow	Salinger			
Date		5-4-56	5-7-56	5-8-56	5-17-56		5-3-56	5-4-56	5-10-56	5-11-56	5-17-56			
Total Count		1699		1391	1366		3472	1503	1568	1571	1169			
Total Gallons		2.24		1.84	1.80		4.58	1.98	2.07	2.07	1.54			
Miles		27		27	27		28.4	23.0	23.1	24	23.2			
MPG		12.05		14.67	15.00	13.91	6.12	11.62	11.16	11.59	15.06		10.12	12.01

TABLE 5

FUEL, IN PERCENT

	Speed Range MPH	Round Trip Evening OP 1	434 S. San Pedro to Van Nuys and Magnolia Noon - OP 3A	5A	Avg.	Van Nuys and Magnolia to 434 S. San Pedro Noon - OP 3B	5B	Avg.
1	0- 8	6.50	4.41	3.55	3.98	6.41	5.65	6.03
2	9-16	13.40	7.92	5.59	6.76	8.88	6.03	7.45
3	17-24	25.95	24.95	23.42	24.18	20.07	13.11	16.59
4	25-32	23.76	38.02	37.30	37.66	26.81	22.97	24.89
5	33-40	18.16	23.80	29.22	26.51	34.87	31.60	33.24
6	41-48	9.67	0.90	0.92	0.91	2.96	16.42	9.69
7	49-56	1.91					4.32	2.11
8	57-65	0.65						
9	66-74							
10	75 and up							
Driver		Bishop	Jan Dickenson			Jan Dickenson		
Date		5-2-56	5-3-56	5-4-56		5-3-56	5-4-56	
Total Count		2462	1996	1520		608	1541	
Total Gallons		3.25	2.63	2.01		0.80	2.03	
Miles		46	28.3	24		9.5	26.8	
MPG		14.15	10.76	11.94	11.35	11.87	13.20	12.54

	Speed Range MPH	Residential Noon 17 P	1:50-3:00 22 P	2:40-3:30 20 OP	Avg.	Business Route Morning 11B P	27 P	Noon 12 P	28 P	Evening 18A P	Avg.
1	0- 8	7.96	19.83	4.81	13.89	7.41	10.23	10.34	13.55	6.01	10.38
2	9-16	16.76	21.55	10.37	19.16	15.98	17.35	21.47	23.68	21.76	19.62
3	17-24	38.77	29.45	11.87	34.11	31.60	34.24	40.39	35.78	36.84	35.50
4	25-32	35.73	23.42	27.13	29.58	31.07	30.02	22.97	24.09	30.01	27.04
5	33-40	0.78	5.75	35.75	3.26	13.86	4.32	4.83	2.90	4.37	6.48
6	41-48			9.74		0.08	3.47			1.01	0.89
7	49-56			0.13			0.37				0.09
8	57-65										
9	66-74										
10	75 and up										
Driver		Anne Polim	Conrow	Parmalee		Ridderhoff	Conrow	Anne Polim	Salinger	Ridderhoff	
Date		5-11-56	5-16-56	5-12-56		5-9-56	5-18-56	5-9-56	5-18-56	5-11-56	
Total Count		1545	696			1133	1066	1924	967	2079	
Total Gallons		2.04	0.92			1.50	1.41	2.54	1.28	3.54	
Miles		26.8	9.5			13.8	14	27.1	13.8	3.2	
MPG		13.14	10.33		11.74	9.20	9.93	10.67	10.78		10.14

TABLE 6

FUEL, IN PERCENT

	Speed Range MPH	Freeway: Morning 11A	26	Evening 13	15A	18B	15B	Noon 29	Avg.	Avg. 11A, 13, 26, 15A	Avg. 15B, 29
1	0- 8	5.98	3.89	3.64	3.63		0.57	1.48	3.20	4.28	1.02
2	9-16	4.18	4.47	5.87	5.23		0.57	1.86	3.70	4.94	1.22
3	17-24	10.14	6.61	14.98	5.50		2.40	3.28	7.15	9:31	2.84
4	25-32	16.67	10.52	21.36	12.68		3.47	3.97	11.44	15.31	3.72
5	33-40	33.33	28.79	13.16	13.21		9.40	6.73	17.44	22.12	8.06
6	41-48	13.04	28.60	19.33	30.23		17.98	14.94	20.68	22.80	16.46
7	49-56	9.78	17.12	18.72	26.33		22.65	35.18	21.63	17.99	28.92
8	57-65	6.88		2.94	3.19		26.31	32.42	11.96	3.25	29.36
9	66-74						16.65	0.14	2.80		8.40
10	75 and up									16.57	16.74
Driver		Ridderhoff	Conrow	Bishop	Conrow	Ridderhoff	Conrow	Salinger			
Date		5-9-56	5-18-56	5-9-56	5-10-56	5-11-56	5-10-56	5-18-56			
Total Count		552	514	988	1128		1585	2899			
Total Gallons		0.73	0.68	1.30	1.49		2.09	3.83			
Miles		11.5	11	22	26		33	67.7			
MPG		15.75	16.18	16.92	17.45		15.79	17.68			

	Speed Range MPH	E-W-A (Mid-morn) To Santa Monica 19A OP	From Santa Monica 19B OP	Avg.	N-S-A To San Pedro 7A OP	21A OP	23A P	Avg.	From San Pedro 7B OP	21B OP	23B OP	Avg.	Avg. of Avgs. To and From San Pedro
1	0- 8	4.94	5.69	5.32	3.11	2.95	5.84	3.97	6.95	4.66	3.77	5.13	4.55
2	9-16	6.48	5.96	6.22	4.45	5.96	6.85	5.75	6.26	12.08	5.90	8.08	6.92
3	17-24	8.67	6.62	7.64	9.32	11.20	10.04	10.19	14.44	24.48	12.24	17.05	13.62
4	25-32	18.00	24.22	21.11	15.78	22.08	26.61	21.49	20.15	30.33	24.77	25.08	23.28
5	33-40	38.48	38.76	38.62	28.58	29.51	26.15	28.08	25.57	17.31	34.24	25.71	26.90
6	41-48	20.80	14.16	17.48	20.78	22.95	11.28	18.33	16.47	11.14	15.66	14.42	16.37
7	49-56	2.36	3.55	2.96	11.15	5.35	13.23	9.91	10.02		3.42	4.48	7.20
8	57-65	0.27	1.04	.65	6.83			2.28	0.14			0.05	1.16
9	66-74												
10	75 and up												
Driver		Parmalee	Parmalee		Salinger	Conrow	Salinger		Salinger	Conrow	Salinger		
Date		5-12-56	5-13-56		5-5-56	5-14-56	5-16-56		5-5-56	5-14-56	5-16-56		
Total Count		1822	1829		1641	1830	1285		2174	1589	2491		
Total Gallons		2.40	2.41		2.17	2.41	1.70		2.87	2.10	3.29		
Miles		32.5	32.5		34.1	34	27.1		34.4	40	49.3		
MPG		13.54	13.48	13.51	15.71	14.11	15.94	15.25	11.99	19.05	14.98	15.34	15.30

TABLE 7

THROTTLE POSITION, IN PERCENT

Van Nuys and Magnolia to 434 S. San Pedro — Morning - Peak

	% Opening	2A	4A	9A	14A	16A	24A	Avg
1	0 - 9	40.58	58.91	52.12	45.72	23.60	33.57	42.42
2	10 - 19	27.29	25.56	19.87	26.47	36.00	21.93	26.19
3	20 - 29	20.40	12.33	14.15	18.53	19.12	29.36	18.98
4	30 - 39	10.54	2.58	5.51	6.16	10.33	10.50	7.60
5	40 - 49	0.62	0.18	3.41	1.80	5.37	3.26	2.44
6	50 - 59	0.07	0.25	1.76	0.79	2.77	0.77	1.07
7	60 - 69	0.07	0.05	1.81	0.07	2.04	0.40	0.74
8	70 - 79	0.34	0.09	0.75	0.12	0.50	0.21	0.33
9	80 - 89	0.09	0.05	0.62	0.12	0.25		0.19
10	90 - 100				0.22	0.02		0.04
Driver		Ridderhoff	Ridderhoff	Conrow	Ridderhoff	Conrow	Salinger	
Date		5-3-56	5-4-56	5-8-56	5-10-56	5-11-56	5-17-56	
Total Count		4382	4413	4374	4058	4361	3744	
Avg % Opening								16.1

434 S. San Pedro to Van Nuys and Magnolia — Evening - Peak

6A	8A	10A	25A	Avg	Avg M and E (P)
51.53	41.53	49.70	35.82	44.68	43.55
20.24	22.49	17.83	24.76	21.33	23.76
19.26	18.78	15.11	18.63	17.94	18.46
5.21	7.90	7.85	10.82	7.94	7.77
2.32	3.38	4.25	5.34	3.82	3.13
1.08	1.55	1.88	2.64	1.78	1.42
0.30	1.77	1.42	1.49	1.24	0.99
0.06	0.61	1.01	0.40	0.52	0.43
	0.40	0.71	0.06	0.29	0.24
	1.59	0.24	0.04	0.46	0.25
Conrow	Bishop	Conrow	Conrow		
5-4-56	5-7-56	5-8-56	5-17-56		
4991	4914	4638	4702		
				17.3	16.7

Van Nuys and Magnolia to 434 S. San Pedro — Evening - Off Peak

	% Opening	6B	8B	10B	25B	Avg (All)	Avg (6B, 10B, 25B)
1	0 - 9	39.76	24.35	37.70	45.25	36.77	40.90
2	10 - 19	17.07	16.72	19.10	21.93	18.70	19.37
3	20 - 29	30.43	13.38	18.04	17.14	19.75	21.87
4	30 - 39	8.07	41.18	10.71	9.00	17.24	9.26
5	40 - 49	3.09	1.54	7.23	3.12	3.74	4.48
6	50 - 59	0.59	0.84	3.36	1.73	1.63	1.89
7	60 - 69	0.67	0.45	2.26	1.32	1.17	1.42
8	70 - 79	0.27	0.37	0.94	0.37	0.49	0.53
9	80 - 89	0.05	0.28	0.44	0.14	0.23	0.21
10	90 - 100		0.89	0.22		0.28	.07
Driver		Conrow	Bishop	Conrow	Conrow		
Date		5-4-56	5-7-56	5-8-56	5-17-56		
Total Count		3720	5381	3183	2946		
Avg % Opening		17.4	24.3	20.9	16.6		18.3

$$\geq \frac{(\% \times \text{Avg Interval Opening})}{100}$$

434 S. San Pedro to Van Nuys and Magnolia — Morning - Off Peak

2B	4B	14B	16B	24B	Avg	Avg M and E (OP)
45.91	44.62	38.39	35.02	34.34	39.66	40.28
22.12	28.16	19.82	12.59	19.55	20.45	19.91
20.00	18.22	17.60	19.83	25.34	20.20	21.03
9.72	7.36	11.67	11.68	13.54	10.79	10.03
1.69	1.35	7.77	8.63	5.90	5.07	4.77
0.33	0.16	2.78	5.21	0.76	1.85	1.87
0.05	0.03	1.70	3.52	0.57	1.17	1.30
0.09	0.10	0.15	1.72		0.41	0.47
0.09		0.12	1.36		0.31	0.26
			0.44		0.09	0.08
Ridderhoff	Ridderhoff	Ridderhoff	Conrow	Salinger		
5-3-56	5-4-56	5-10-56	5-11-56	5-17-56		
4259	3111	3410	3606	3663		
					18.6	18.4

TABLE 8

THROTTLE POSITION, IN PERCENT

	% Opening	Round Trip Evening 1 OP	434 S. San Pedro to V. N. and M. Noon - OP 3A	434 S. San Pedro to V. N. and M. Noon - OP 5A	V. N. and M. to 434 S. San Pedro Noon - OP 3B	V. N. and M. to 434 S. San Pedro Noon - OP 5B
1	0 - 9	33.78	Failure	44.04	Failure	42.59
2	10 - 19	24.52	in unit	29.50	in unit	38.06
3	20 - 29	28.16		14.56		10.54
4	30 - 39	9.15		10.59		8.76
5	40 - 49	2.12		1.31		0.05
6	50 - 59	0.95				
7	60 - 69	0.52				
8	70 - 79	0.29				
9	80 - 89	0.29				
10	90 - 100	0.22				
Driver		Bishop	Jan Dickenson		Jan Dickenson	
Date		5-2-56	5-3-56	5-4-56	5-3-56	5-4-56
Total Count		7654		3806		3928
Avg % Opening $\frac{\Sigma(\% \times \text{Avg Interval Opening})}{100}$		18.1		14.6		13.6

	% Opening	Residential Noon 17 P	Residential 1:50-3:00 22 P	Residential 2:40-3:30 20 OP	Residential Avg	Business Route Morning 11B P	Business Route Morning 27 P	Business Route Noon 12 P	Business Route Noon 28 P	Business Route Evening 18A P	Business Route Avg
1	0 - 9	40.10	41.90	54.68	41.00	55.94	66.95	56.08	69.68	60.51	61.83
2	10 - 19	17.97	25.23	8.51	21.60	16.89	13.76	16.62	15.20	19.84	16.46
3	20 - 29	29.38	17.10	9.51	23.24	12.79	9.75	17.16	11.78	11.09	12.51
4	30 - 39	11.60	6.65	7.57	9.12	8.05	5.52	8.53	2.83	4.72	5.93
5	40 - 49	0.93	4.02	7.43	2.48	4.32	1.98	1.24	0.49	2.05	2.02
6	50 - 59	0.02	2.20	4.68	1.11	1.25	1.51	0.35	0.02	0.73	0.77
7	60 - 69		1.34	3.19	0.67	0.45	0.44	0.02		0.52	0.29
8	70 - 79		0.52	2.08	0.26	0.11	0.03			0.25	0.08
9	80 - 89		0.48	1.83	0.24	0.09	0.06			0.07	0.04
10	90 - 100		0.56	1.11	0.28	0.11				0.22	0.07
Driver		Anne Polim	Conrow	Parmalee		Ridderhoff	Conrow	Anne Polim	Salinger	Ridderhoff	
Date		5-11-56	5-16-56	5-12-56		5-9-56	5-18-56	5-9-56	5-18-56	5-11-56	
Total Count		5527	2315	2786		3518	3640	7400	4099	4003	
Avg % Opening					17.1						12.4

TABLE 9

THROTTLE POSITION, IN PERCENT

		Freeway									
		Morning		Evening				Noon		P	OP
	% Opening	11A	26	13	15A	18B	15B	29	Avg	Avg 11A, 26, 13, 15A, 18B	Avg 15B, 29
1	0 - 9	25.36	41.08	26.50	23.43	37.77	8.24	19.88	26.04	30.83	14.06
2	10 - 19	29.73	27.44	23.27	20.02	23.11	19.88	19.24	23.24	24.72	19.56
3	20 - 29	26.96	20.88	34.80	28.36	22.63	20.20	43.08	28.13	26.73	31.64
4	30 - 39	13.79	7.24	14.02	18.00	9.32	27.10	16.36	15.12	12.47	21.73
5	40 - 49	2.77	2.06	1.23	6.50	4.38	15.49	0.80	4.75	3.39	8.14
6	50 - 59	0.76	0.69	0.18	2.02	2.07	3.76	0.64	1.44	1.14	2.20
7	60 - 69	0.35	0.31		1.10	0.64	2.51		.70	0.48	1.26
8	70 - 79	0.28	0.15		0.32	0.00	1.33		.30	0.15	0.66
9	80 - 89		0.15		0.18	0.08	0.90		.19	0.08	0.45
10	90 - 100				0.07		0.59		.09	0.01	0.30
Driver		Ridderhoff	Conrow	Bishop	Conrow	Ridderhoff	Conrow	Salinger			
Date		5-9-56	5-18-56	5-9-56	5-10-56	5-11-56	5-10-56	5-18-56			
Total Count		1443	1312	1285	2817	1255	2550	5011			
Avg % Opening										19.0	26.0

		E-W-A (Mid-Morn)			N-S-A								
		To Santa Monica	From Santa Monica		To San Pedro				From San Pedro				
	% Opening	19A OP	19B OP	Avg	7A OP	21A OP	23A P	Avg	7B OP	21B OP	23B OP	Avg	Avg of Avgs
1	0 - 9	42.44	38.92	40.68	Failure	29.66	40.49	35.08	Failure	33.05	28.58	30.82	32.95
2	10 - 19	20.33	20.54	20.44	in unit	17.49	35.02	26.26	in unit	21.12	22.95	22.04	24.15
3	20 - 29	19.00	19.80	19.40		27.05	17.62	22.34		23.13	28.56	25.84	24.09
4	30 - 39	8.17	10.51	9.34		15.40	5.40	10.40		13.52	12.32	12.92	11.66
5	40 - 49	5.40	6.97	6.18		6.28	0.79	3.53		4.95	5.97	5.46	4.50
6	50 - 59	2.09	2.26	2.18		2.58	0,34	1.46		2.58	1.12	1.85	1.65
7	60 - 69	1.52	0.49	1.00		1.12	0.19	0.65		0.88	0.32	0.60	.62
8	70 - 79	0.43	0.33	0.38		0.23	0.15	0.19		0.42	0.13	0.27	.23
9	80 - 89	0.24	0.15	0.20		0.12		0.06		0.19	0.05	0.12	.09
10	90 - 100	0.38	0.03	0.20		0.07		0.03		0.16		0.08	.06
Driver		Parmalee	Parmalee		Salinger	Conrow	Salinger		Salinger	Conrow	Salinger		
Date		5-12-56	5-12-56		5-5-56	5-14-56	5-16-56		5-5-56	5-14-56	5-16-56		
Total Count		4201	3890			4299	2667			5659	5900		
Avg % Opening $=\frac{\Sigma(\% \times \text{Avg Interval Opening})}{100}$				18.5				18.0				20.1	19.0

TABLE 10
ACCELERATION AND DECELERATION, IN PERCENT

Van Nuys and Magnolia to 434 S. San Pedro — Morning - Peak

		Ft./Sec.^{2}	2A	4A	9A	14A	16A	24A	Avg.
Acc.	6	15 to 18							
	5	12 to 15	0.09	0.04					0.03
	4	9 to 12	0.17	0.21	0.46	0.05			0.18
	3	6 to 9	2.78	1.62	1.73	0.51	1.16		1.56
	2	3 to 6	10.30	9.00	5.34	3.89	4.12		6.53
	±1	-3 to +3	65.16	78.58	74.38	88.66	81.87		77.73
Dec.	-2	-3 to -6	12.29	3.83	8.49	4.86	10.42		7.98
	-3	-6 to -9	8.69	6.20	9.09	1.89	2.13		5.60
	-4	-9 to -12	0.43	0.40	0.39	0.12	0.28		0.32
	-5	-12 to -15	0.09	0.12	0.12	0.02	0.02		0.07
	-6	-15 to -18							
Driver			Ridderhoff	Ridderhoff	Conrow	Ridderhoff	Conrow	Salinger	
Date			5-3-56	5-4-56	5-8-56	5-10-56	5-11-56	5-17-56	
Total Count			4670	4809	4324	4134	4318		
Avg. Acc. and Dec.									-0.39

434 S. San Pedro to Van Nuys and Magnolia — Evening - Peak

		Ft./Sec.^{2}	6A	8A	10A	25A	Avg.
Acc.	6	15 to 18	0.09	0.08			0.04
	5	12 to 15	0.15	0.25	0.02	0.04	0.11
	4	9 to 12	0.66	0.41	0.49	0.92	0.62
	3	6 to 9	3.43	1.66	2.98	2.97	2.76
	2	3 to 6	15.05	6.96	8.11	14.60	11.18
	±1	-3 to +3	69.75	78.95	76.56	71.59	74.21
Dec.	-2	-3 to -6	4.21	5.86	6.05	8.94	6.27
	-3	-6 to -9	6.58	5.77	5.73	0.92	4.75
	-4	-9 to -12	0.04	0.06	0.06	0.02	0.04
	-5	-12 to -15	0.02				0.01
	-6	-15 to -18	0.02				0.01
Driver			Conrow	Bishop	Conrow	Conrow	
Date			5-4-56	5-7-56	5-8-56	5-17-56	
Total Count			5302	5117	4661	4787	
Avg. Acc. and Dec.							+0.15

% X Avg. INT. Acc. or Dec. / 100

Van Nuys and Magnolia to 434 S. San Pedro — Evening - OP

		Ft./Sec.^{2}	6B	8B	10B	25B	Avg.
Acc.	6	15 to 18				0.03	0.01
	5	12 to 15		0.40		0.20	0.15
	4	9 to 12	0.40	0.66	0.29	0.75	0.53
	3	6 to 9	3.38	2.55	2.57	2.86	2.84
	2	3 to 6	10.98	7.32	8.92	9.67	9.22
	±1	-3 to +3	75.38	78.42	74.65	79.92	77.09
Dec.	-2	-3 to -6	5.37	6.83	7.64	4.83	6.17
	-3	-6 to -9	4.23	3.79	5.71	1.36	3.77
	-4	-9 to -12	0.21	0.03	0.19	0.31	0.18
	-5	-12 to -15	0.05		0.03	0.07	0.04
	-6	-15 to -18					
Driver			Conrow	Bishop	Conrow	Conrow	
Date			5-4-56	5-7-56	5-8-56	5-17-56	
Total Count			4228	3485	3117	2937	
Avg. Acc. and Dec.							+0.12

434 S. San Pedro to Van Nuys and Magnolia — Morning - OP

		Ft./Sec.^{2}	2B	4B	14B	16B	24B	Avg.	Avg. of Avgs. M (P and OP) E (P and OP)
Acc.	6	15 to 18							0.01
	5	12 to 15	0.03	0.12				0.03	0.08
	4	9 to 12	0.17	1.14	0.09	0.54		0.39	0.43
	3	6 to 9	0.54	4.62	0.40	1.62	0.62	1.56	2.19
	2	3 to 6	10.99	16.13	5.09	6.24	10.12	9.71	9.16
	±1	-3 to +3	76.14	65.02	84.40	73.29	84.60	76.69	76.43
Dec.	-2	-3 to -6	4.50	6.10	6.83	14.13	4.35	7.18	6.90
	-3	-6 to -9	6.81	6.22	2.85	3.53	0.31	3.94	4.51
	-4	-9 to -12	0.69	0.53	0.14	0.58		0.39	0.23
	-5	-12 to -15	0.10	0.12	0.17	0.05		0.09	0.05
	-6	-15 to -18	0.03		0.03	0.02		0.02	0.01
Driver			Ridderhoff	Ridderhoff	Ridderhoff	Conrow	Salinger		
Date			5-3-56	5-4-56	5-10-56	5-11-56	5-17-56		
Total Count			4040	3423	3515	4104	3538		
Avg. Acc. and Dec.								-0.08	

TABLE 11

ACCELERATION AND DECELERATION, IN PERCENT

		Ft./Sec.^{2}	Round Trip Evening OP 1	434 S. San Pedro to Van Nuys and Magnolia Noon - OP 3A	5A	Avg.	Van Nuys and Magnolia to 434 S. San Pedro Noon - OP 3B	5B	Avg.
Acc.	6	15 to 18	0.01						
	5	12 to 15	0.22						
	4	9 to 12	0.51		0.12	0.06			
	3	6 to 9	1.59	1.88	3.04	2.46	0.35	1.65	1.00
	2	3 to 6	7.54	14.90	20.08	17.49	8.27	11.80	10.04
	±1	-3 to +3	81.99	66.12	66.83	66.48	78.32	80.32	79.32
Dec.	-2	-3 to -6	6.09	12.07	5.75	8.91	8.61	3.58	6.10
	-3	-6 to -9	1.92	4.90	4.11	4.50	4.39	2.55	3.47
	-4	-9 to -12	0.10	0.11	0.07	0.09	0.06	0.05	0.05
	-5	-12 to -15	0.03	0.02		0.01		0.05	0.02
	-6	-15 to -18							
Driver			Bishop	Jan Dickenson			Jan Dickenson		
Date			5-2-56	5-3-56	5-4-56		5-3-56	5-4-56	
Total Count			7800	5584	4138		1730	4360	
Avg. Acc. and Dec.			+0.11			+0.23			-0.02

% X Avg. INT. Acc. or Dec.
100

		Ft./Sec.^{2}	Residential Noon 17 P	1:50-3:00 22 P	2:40-3:30 20 OP	Avg.	Business Route Morning 11B P	27 P	Noon 12 P	28 P	Evening 18A P	Avg.
Acc.	6	15 to 18			0.07							
	5	12 to 15		0.12	0.36	0.06		0.09			0.15	0.05
	4	9 to 12	0.07	1.79	2.72	0.93	0.31	0.51		0.07	0.34	0.25
	3	6 to 9	0.68	3.50	7.87	2.09	3.44	4.79	0.82	1.66	1.35	2.41
	2	3 to 6	7.49	11.12	10.22	9.31	11.96	12.34	10.18	11.95	7.77	10.84
	±1	-3 to +3	80.40	75.78	78.70	78.09	63.17	74.97	77.33	75.85	76.45	73.56
Dec.	-2	-3 to -6	9.16	5.64	11.19	7.40	9.30	6.58	10.54	9.97	10.71	9.42
	-3	-6 to -9	2.11	1.71	2.86	1.91	11.20	0.69	0.98	0.30	2.55	3.14
	-4	-9 to -12	0.07	0.34	1.57	0.20	0.56	0.03	0.11	0.15	0.56	0.28
	-5	-12 to -15	-		0.36	-	0.06		0.04		0.12	0.04
	-6	-15 to -18	0.02		0.07	0.01				0.05		0.01
Driver			Anne Polim	Conrow	Parmalee		Ridderhoff	Conrow	Anne Polim,	Salinger	Ridderhoff	
Date			5-11-56	5-16-56	5-12-56		5-9-56	5-18-56	5-9-56	5-18-56	5-11-56	
Total Count			5730	2572	2797		3603	3340	7427	3983	4080	

TABLE 12
ACCELERATION AND DECELERATION, IN PERCENT

		Ft./Sec.²	Freeway: Morning 11A	Morning 26	Evening 13	Evening 15A	Evening 18B	Evening 15B	Noon 29	Complete Avg.	Avg. W/O 15B and 29	Avg. 15B, 29
Acc.	6	15 to 18										
	5	12 to 15		0.09						0.01	0.02	
	4	9 to 12	0.20	0.09				0.08		0.05	0.06	0.04
	3	6 to 9	0.55	1.11	0.03	0.10	0.59	0.24	0.16	0.40	0.47	0.20
	2	3 to 6	3.70	5.82	0.98	1.39	3.61	0.80	3.37	2.81	3.10	2.08
	±1	-3 to +3	85.48	89.56	95.75	93.06	89.84	94.99	95.06	91.97	90.74	95.03
Dec.	-2	-3 to -6	2.74	2.87	2.51	4.56	5.00	3.49	1.17	3.19	3.54	2.33
	-3	-6 to -9	7.05	0.28	0.63	0.75	0.81	0.40	0.18	1.44	1.90	0.29
	-4	-9 to -12	.07	0.18	0.10	0.10	0.15		0.06	0.09	0.12	0.03
	-5	-12 to -15	.07			0.04				0.02	0.02	
	-6	-15 to -18	.14							0.02	0.03	
Driver			Ridderhoff	Conrow	Bishop	Conrow	Ridderhoff	Conrow	Salinger			
Date			5-9-56	5-18-56	5-9-56	5-10-56	5-11-56	5-10-56	5-18-56			
Total Count			1460	1082	2871	2810	1359	2495	5037			

		Ft./Sec.²	E-W-A (Mid-Morn) To Santa Monica 19A OP	From Santa Monica 19B OP	Avg.	N-S-A To San Pedro 7A OP	21A OP	23A P	Avg.	From San Pedro 7B OP	21B OP	23B OP	Avg.	Avg. of Avgs.	Avg. of Avgs. Checked ( )
Acc.	6	15 to 18													
	5	12 to 15	0.19	0.16	0.18			0.11	0.04	0.02			0.01	0.02	0.06
	4	9 to 12	1.32	0.89	1.10	0.15	0.62	0.37	0.38	0.18	0.54	0.02	0.25	0.32	0.45
	3	6 to 9	3.32	2.81	3.06	1.65	1.82	1.15	1.54	2.62	2.44	0.03	1.70	1.62	1.64
	2	3 to 6	8.46	7.04	7.75	7.46	7.02	7.89	7.46	16.97	7.63	10.60	11.73	9.60	7.11
	±1	-3 to +3	73.65	76.56	75.11	84.78	82.25	86.45	84.49	75.67	83.33	84.08	81.02	82.75	82.55
Dec.	-2	-3 to -6	10.64	10.07	10.36	3.82	6.79	3.42	4.68	2.50	4.96	4.28	3.91	4.30	6.22
	-3	-6 to -9	1.91	1.83	1.87	1.99	1.25	0.52	1.25	1.81	0.89	0.81	1.17	1.21	1.72
	-4	-9 to -12	0.44	0.46	0.45	0.07	0.20	0.03	0.10	0.15	0.17	0.18	0.17	0.13	0.20
	-5	-12 to -15	0.02	0.11	0.06	0.05	0.05	0.06	0.05	0.03	0.04		0.02	0.04	0.03
	-6	-15 to -18	0.05	0.07	0.06	0.03			0.01	0.05			0.02	0.01	0.02
Driver			Parmalee	Parmalee		Salinger	Conrow	Salinger		Salinger	Conrow	Salinger			
Date			5-12-56	5-12-56		5-5-56	5-14-56	5-16-56		5-5-56	5-14-56	5-16-56			
Total Count			4303	4378		4062	4388	3484		6182	5726	5917			