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Cordon Count Survey
Downtown Long Beach
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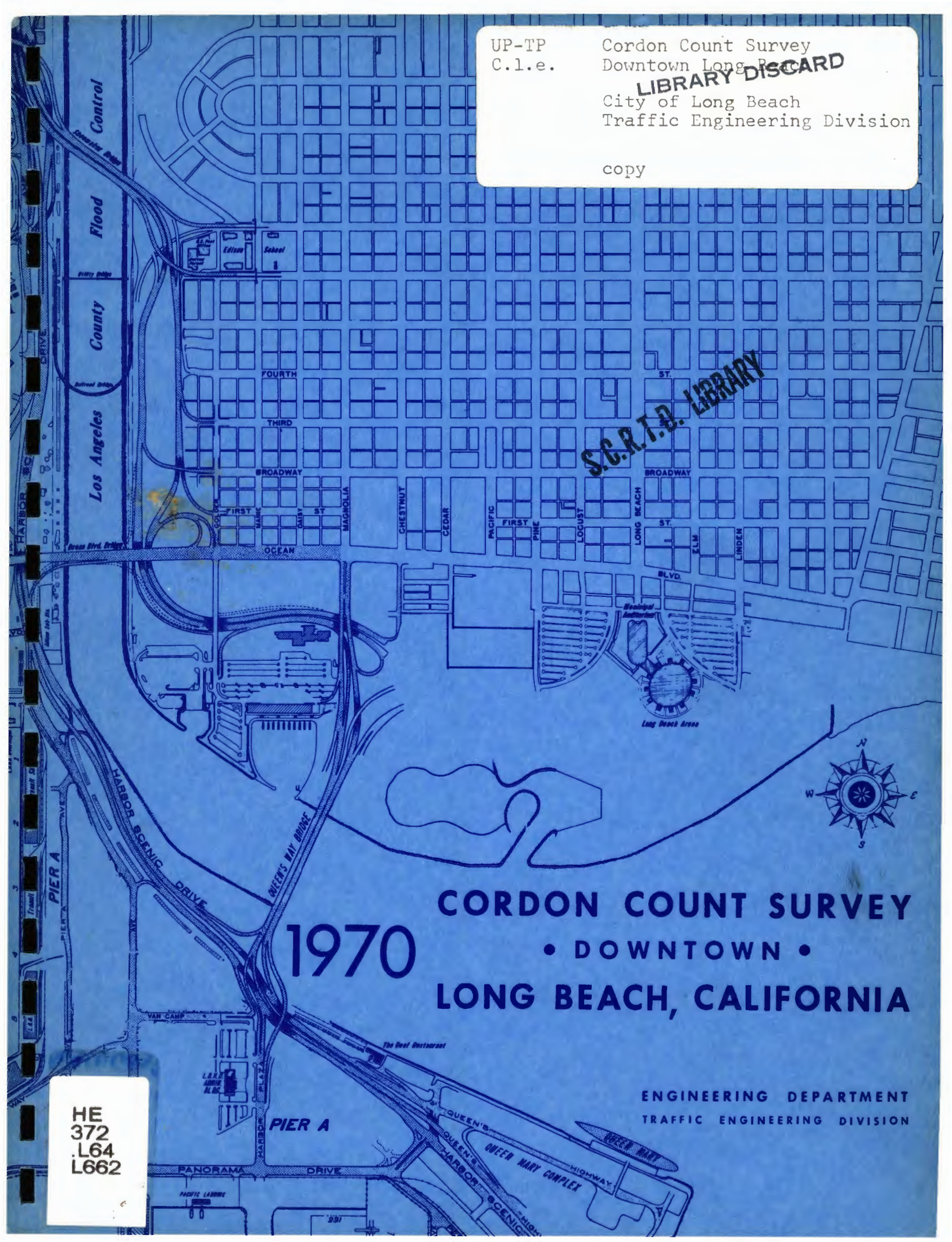
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CORDON COUNT SURVEY • DOWNTOWN • 1970 LONG BEACH, CALIFORNIA

ENGINEERING DEPARTMENT
TRAFFIC ENGINEERING DIVISION

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Long Beach

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• Cordon Count

1970

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Prepared by Traffic Engineering Division

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ACKNOWLEDGEMENT

The Transit data in this study has been obtained with cooperation of:

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J. A. Cooper - Assistant General Manager

Southern California Rapid Transit District
George F. Goehler - Gen. Supt. of Transportation
Howard C. Beardsley - Director of Surface Planning
and Schedules
C. N. Holzer - Associate Transportation Engineer

Long Beach Bureau of Franchises and Public Utilities
Louis Possner - Chief Engineer - Secretary

Airport Service Bus Line

Torrance Municipal Line

Union Pacific Railroad Company

Western Greyhound Lines

Continental Trailways Company

CORDON COUNT SURVEY
DOWNTOWN LONG BEACH

SPRING 1970

TABLE OF CONTENTS

Introduction	Page 1
Survey Findings	Page 2
Cordon Count Procedures	Page 5
Appendix - (Explanation of Figures and Tables)	

FIGURES

- Figure 1 - The cordon area boundaries.
- Fig. 2-A - 14-hour vehicle volumes by location.
- " 2-B - 7-8 A.M. hour volumes by location.
- " 2-C - 4:30 - 5:30 P.M. hour volumes by location.
- " 3-A - A.M. and P.M. hourly volumes by location.
- " 3-B - Volume/capacity ratios and level of service
for all streets crossing Cordon boundary.
- Figure 4 - Modal Split vehicle and passenger percentages.
- Figure 5 - Vehicles entering and leaving Cordon Area by
half-hour periods.
- Figure 6 - Vehicles accumulated in Cordon Area by half-
hour periods.
- Figure 7 - Persons entering and leaving Cordon Area by
half-hour periods.
- Figure 8 - Persons accumulated in Cordon Area by half-
hour periods.
- Figure 9 - 14-hour total bus volumes by location.
- Fig. 10 - L. B. Public Transportation Company bus routes
and volumes.
- Fig. 11 - SCRTD bus routes and volumes.
- Fig. 12 - All other bus line routes and volumes.

TABLE OF CONTENTS

Page 2

- Table 1 - Summary of vehicles by location.
- Table 2 - Summary of persons by location.
- Table 3 - Summary of vehicles by half-hour periods.
- Table 4 - Summary of persons by half-hour periods.
- Table 5 - Summary of busses by location.
- Table 6 - Summary of bus passengers by location.
- Table 7 - Summary of busses by half-hour periods.
- Table 8 - Summary of bus passengers by half-hour periods.
- Table 9 - Summary of capacities by location at Cordon boundaries.

CORDON COUNT SURVEY
DOWNTOWN LONG BEACH

SPRING 1970

INTRODUCTION

On three typical midweek days in May and June of 1970 a comprehensive cordon count survey was carried out by the Traffic Engineering Division of the Engineering Department of the City of Long Beach. This is the first comprehensive and detailed survey of this nature which has been performed in the City in more than twenty years.

The purpose of the survey was to measure the transportation activity generated by the Central Business District (CBD), and to establish a statistical data base. This data base can be used in special studies to determine transportation needs in terms of transit service, street capacity and parking facilities.

Briefly, the objectives of the cordon count were:

- 1) To develop information about the mode of travel, hourly pattern and total of persons entering and leaving the Cordon area;
- 2) To establish the hourly pattern of accumulation of persons and vehicles in the Cordon area;
- 3) To use the above data (1) and (2) as a base for future measurements on a yearly basis.

Since a study of similar nature has not been made in more than twenty years it was felt that interest for the survey might be great among planners, businessmen and others concerned with downtown. The thought was expressed that more detail on bus transit and some analysis on street capacity was needed as part of this report to promote the understanding and usefulness of the data. This has resulted in a special chapter on Bus Transit and more figures and tables than in a usual survey.

A parking survey of On and Off-street parking was also completed concurrent with the Cordon Survey and will be published separately.

The size of the survey area (Figure 1) is approximately 0.65 square mile and roughly follows the boundaries of the Central Business District as defined by the Bureau of Census. The limits of the area are 6th Street to the north, Pacific Ocean to the south, Olive Avenue to the east and Long Beach Freeway to the west.

Long Beach CBD is diversified in its development and encompasses the typical downtown commercial and business establishments and numerous professional services such as law, medical, financial and banking. It also provides for the hub of the City's essential services and administration, as well as entertainment and residential areas.

Changes in the intensity or type of land use development within a downtown area are reflected in the changing pattern of travel characteristics. An expanding freeway system such as the future Pacific Coast Freeway, the proposed Shoreline Drive and Alamitos Freeway type facilities provide a freeway loop around the downtown and greatly increase the accessibility to the Area. The opening of the Queen's Way Bridge created another gateway to the downtown and will have to be counted in the next Survey.

With this report and a continuing program of cordon counts it is hoped that the data collected will provide a tool for future planning of the Central Business District of Long Beach.

SURVEY FINDINGS

GENERAL

The results of the Study revealed that the total number of persons entering and leaving by all modes is 126,760 and 121,417 persons respectively (Table 4). This approximately 5,000 persons difference may be accounted for by the great diversity of the City's downtown area which can attract entertainment-bound individuals to numerous movie theaters, municipal auditorium and arena, and not record their departure after the 8:00 P.M. termination of the survey.

Automobiles or passenger cars accounted for 96.9% of the total vehicles and 90.2% of the passengers, while the corresponding bus percentages were 1.1% and 8.4% respectively. (Figure 4). These numbers are based on total traffic entering the boundaries of which a part is through traffic with regard to passenger cars. Since all the buses are destined for the survey area the above percentages are somewhat low regarding bus traffic and correspondingly high for passenger cars. A spot check of numbers in Table 4 showed that the maximum accumulation of bus passengers downtown (1422) was 12.5% of the total person accumulation at this hour (12:30 PM). The morning hours from 6:30 to 8:00 A.M. shows that only 4.2% (227 persons) of the total person accumulation came by bus, and at the time the survey ended at 8:00 P.M., 10.6% (567 persons) had arrived by bus. The corresponding percentages for vehicles were negative indicating outbound buses prevailed except at 8:00 P.M. when 9.2% on 36 buses had accumulated.

To obtain theoretically correct modal split percentages a measurement of the amount of through traffic (which is predominant in the rush hour period) should be made.

Traffic volumes entering and leaving the cordon area by location indicates that traffic flow into and out of the downtown area is fairly well balanced except during morning and evening peak hours. The east-west arterials suffer most in the P.M. peak hour when the eastbound demand exceeds capacity at the east cordon boundary on Ocean Boulevard and 4th Street. (Figures 3-A and 3-B).

Ocean Boulevard has a very heavy influx of through traffic from the industrial areas west of the Los Angeles River and carries the brunt of the Harbor and Navy Base traffic both in the morning and evening. The eastbound PM peak Hour traffic volumes exceed the calculated theoretical capacity at Alamitos Avenue and the street operates under forced flow (level of Service F) conditions in this vicinity.

Fourth Street is a main carrier of city-originated eastbound traffic such as shopping trips and also work traffic. This street is operating at capacity in the evening rush hour - (level of Service E).

Broadway is the third main street to carry eastbound traffic. It also carries a big percentage of through traffic from west of the Los Angeles River and is heavily loaded in the P.M. peak hour. Volumes are approaching capacity at the east Cordon boundary but an acceptable level of service (D) still exists.

These three streets carry the bulk of the eastbound traffic from the C. B. D. in the P.M. First Street provides additional capacity of about 500 cars which is significant relief for the peak eastbound traffic demand.

Westbound traffic demand in the morning peak hour does not exceed capacity on Ocean Boulevard, Third Street or Fourth Street. At this time acceptable levels of service are provided both at the east and west Cordon boundary.

The north-south arterials are not at a critical stage regarding capacity in the peak hours but are presently operating at an acceptable level of service. Magnolia Avenue is approaching capacity while Pacific Avenue can handle 50% more traffic and Atlantic Avenue can handle 20% to 30% more traffic respectively. Additional capacity is provided by others. The key to effective use of this untapped capacity is proper planning of access to the various streets in order to create proper use of the street system.

PASSENGER CARS AND TRUCK

The volume of passenger and truck vehicular traffic entering and leaving the Cordon count boundaries is 85,749 vehicles and 81,863 vehicles, respectively, reflecting a slightly greater inbound trend. Correspondingly, passenger occupancy figures support the vehicular trend with 116,146 persons entering the C.B.D. and 111,370 leaving during the time of survey. Passenger vehicle occupancy varied from one to over two persons per car but overall average was 1.4 persons/car for the survey period.

TRANSIT

Long Beach Public Transportation Company and the Southern California Rapid Transit District are presently serving the major intracity and intercity needs of the C.B.D. respectively. Other bus lines such as Airport Service Busline serving LAX, Torrance Municipal Line, and Union Pacific Railroad Company shuttle-bus service for train passengers account for only about four percent of the bus passenger service to and from downtown. There are two major intrastate bus lines, Western Greyhound Line and Continental Trailways Company. Both these lines provide a commuter service beside an interstate and intrastate service. All C.B.D. transit passenger pickups and trip termination are on-street bus locations. The only complete off-street terminal facility is provided by Western Greyhound Line located on Long Beach Boulevard at Broadway. Continental Trailways Company located at Long Beach Boulevard and First Street only has a ticket office. Western Greyhound provides for all passenger services, i.e., food, waiting room, etc. with berths for six (6) busses. Continental Trailways only provides the minimal commuter needs in its ticketoffice and has no customer parking. The busses park on the street.

Bus movement into and out of the core area is a balanced operation for the most part, with 920 total busses entering the area, and 884 leaving between 6:00 A.M. and 8:00 P.M. The higher inbound movement of approximately 40 busses is primarily due to busses which have gone out of service in the core area during the survey period. Occupancy data reveals that there are 10,614 inbound passengers and 10,057 outbound. All of the lines follow the same imbalanced occupancy flow except the Rapid Transit District which facilitated approximately 150 more outbound passenger than inbound.

There is also a significant size cab fleet to serve downtown.. The Diamond Cab Company and the Yellow Cab Company have merged operations, having a combined fleet of approximately 120 cabs with over half a million annual in-city trips.

CORDON COUNT PROCEDURE

The counting period was selected as the 14-hour period from 6:00 AM to 8:00 PM because it was decided that most downtown activity would be accounted for in this time period. Man-power scheduling was also easier this way and requiring less manpower. A parking study establishing number of cars parked in the survey area before six o'clock should have been performed to obtain the theoretically correct accumulation total. The next survey should take this into account when preparing tables and figures.

A detailed procedure manual to be followed has been worked out and the following is a general description of the techniques used.

PASSENGER CARS AND TRUCKS

Counting stations were established at all crossing points of the cordon line. Stations were not located at intersections, but midblock, in order to simplify the counting procedures. To measure accumulation of traffic in the area both incoming and outgoing traffic was recorded, thereby establishing two counting stations for every two-way street for a total of 37 directional counting stations.

Pedestrian traffic was excluded from the study since there are very few at the fringes of the study area.

Vehicle counts were obtained by use of mechanical counters with manual sample counts for vehicle type (excluding busses) drivers and passengers. Vehicle classification was made simple in that all vehicles such as pick-up trucks, vans and campers as well as taxis were classified as passenger automobiles. The accuracy of the mechanical counters was thus verified by simultaneous manual checking of the counting machines during this sample count operation. Because of the relatively high number of cordon count stations, 37 stations compared to counting equipment available, use of a five-day counting schedule was necessary.

Preliminary investigations indicated that any Tuesday, Wednesday or Thursday in May or first week of June would be a typical day in this area. The count was taken on Thursday, May 21, Tuesday and Wednesday, May 26 and 27, Wednesday and Thursday, June 3 and 4.

The sample count procedure utilized six persons working in two shifts. Manual sampling of passenger occupancy counts was accomplished by six-minute sampling during each hour at pre-chosen random selected stations. One person handled six stations

an hour including travel time, which required a total of 14 man-hours to cover six stations in the total daily counting period. Therefore, for the 14-hour count two shifts of three persons sampling was required for each shift or a total of six persons per day was used.

TRANSIT

Bus vehicle volume and passenger occupancy were obtained from the various bus lines. The passengers in every bus were counted, except in a few minor cases where actual counts were impossible to obtain and estimates had to be used. The occupancy data was obtained as each bus passed a predetermined point close to the Cordon boundary. Also recorded was arrival and departure time to the closest minute. Techniques for acquiring the needed data varied by different companies.

For Long Beach Public Transportation Company sampling of bus trips and occupancy was done with the cooperation of the drivers. Passenger count forms were developed and provided for each bus on every route that would enter or leave the Cordon area in a 24-hour period. Many busses would have through core area routes and the check sheets were arranged so that both inbound and outbound occupancy checks could be made relative to the Cordon boundary. A total of 10 routes providing 96 busses per day were surveyed. The checks were made for three days and then averaged to obtain typical loading factors.

Southern California Rapid Transit District used their own experienced traffic checkers to record the data in a similar way. Six separate RDT bus lines which serve the downtown area with a total of 43 busses per day were sampled.

In the case of the Airport Service Bus Line the average daily load figures for an average day were acquired direct from the company's receipts. This line provides 27 round trips per day to LAX.

The Torrance Municipal Line and the Union Pacific Railroad could only provide estimates for the passenger loading, and the time schedule was only approximated. The sample sizes were 13 and 2 round trips per day respectively for a midweek day. Both had only one route.

The two major intrastate bus lines operating out of Long Beach CBD, the Western Greyhound Line and the Continental Trailways Company provide major interstate passenger service as well as intrastate service. Data regarding through passenger volume coming into the CBD as a portion of a lengthier trip could not be obtained. Both lines provide a commuter or shuttle service of which occupancy data and arrival-departure times were acquired relative to the Cordon boundary.

APPENDIX

EXPLANATION OF FIGURES AND TABLES

This explanation has been prepared to provide a better understanding of the background for some of the figures and tables. In most instances it is straightforward, however, some of the data presentation has been done in anticipation of future use in analysis. Since this is only speculative other types of data arrangements and presentations may prove more useful in the future. In that case the presentations should be changed to fit the new requirements.

Figure 1 - The CBD area as defined by the Bureau of Census was the basis for the survey area because it was felt that Census Data could then be easily correlated with the survey findings at subsequent analysis. However, to exclude as much through traffic from the survey data as possible it was decided to move the northern boundary line south of 6th Street and the eastern boundary to west of Olive Avenue (Through traffic will inflate the numbers relative to downtown activity and may also distort analysis of the data as in the case of modal split where busses are only serving downtown but some of the passenger cars are going through).

Figure 2 (A B C) and Figure 3 (A-B) - These figures are graphical displays of vehicular activity. Figure 2-A shows the total vehicular activity in the 14-hour survey period while the peak hours were chosen as typical for the majority of the streets in the area (2-B, 2-C).

However, some streets have their maximum traffic load in one direction at other hours than the "normal" peak hours. Northbound Pacific Avenue for example, has its maximum A.M. vehicular volume at the cordon boundary from 11 AM to 12 AM. Maximum volumes which do not necessarily fall at the same hour on all streets are shown in Figure 3-A. These volumes are used as the basis for the volume capacity ratios shown in Figure 3-B. The level of Service D is generally considered acceptable in the maximum demand hours in downtown areas. The figure shows what the existing level of service is on the streets at the cordon boundary at the time of maximum traffic demand. At all other times will better service be had at these points.

Figure 4 shows the modal split percentages. These numbers are based on total traffic entering the boundaries of which a part is through traffic with regard to passenger cars. Since all the busses are destined for the survey area the above percentages are somewhat low regarding bus traffic and correspondingly high for passenger cars. A spot check of numbers in Table 4 showed that the maximum accumulation of bus passengers downtown (1422) was 12.5% of the total person accumulation at this hour (12:30 PM). The morning hours from 6:30 to 8:00 AM shows that

Only 4.2% (227 persons) of the total person accumulation came by bus, and at the time of the survey ended at 8:00 PM, 10.6% (567 persons) had arrived by bus. The corresponding percentages for busses were negative except at 8:00 PM when 9.2% or 36 busses had accumulated. This is because out-of-service vehicles entering in the morning and leaving in the evening were not counted.

Figure 5 - is a graphical presentation of data in Table 3 and includes all vehicles crossing the Cordon boundary by half-hour periods.

Figure 6 - is a graphical presentation of the accumulation data shown in Table 3 and includes all vehicles remaining within the Cordon boundaries at any specific time. Since a parking survey was not made before the start of the count these data do not include vehicles parked within the boundaries prior to 6:00 AM. The accumulation will be somewhat larger when these parked vehicles are included in the next Cordon survey.

Figures 7 and 8 - are graphical presentations of data in Table 4. The person calculations were based upon vehicle occupancy sample data which were obtained at each cordon station for each half-hour period. The vehicle occupancy factor for each half-hour at each location for passenger cars and trucks was multiplied by the number of vehicles in each category for the same time and the same location and then the results were summed with the corresponding bus passenger figures. Figure 6 and 8 are complementary insofar they show accumulation data. The person accumulation is also low because people living within the boundary were not estimated and is not part of the data. They should, however, be included in the next survey.

Figure 9 - shows total number of scheduled transit trips to and from downtown in the 14-hour survey period and do not include busses out of service which enter in the morning and leave in the evening. Therefore there are negative accumulations listed.

Figures 10 and 11 - show the transit route numbers and number of busses in detail for the two main carriers serving downtown, namely Long Beach Public Transportation Company and Southern California Rapid Transit District. The latter may only discharge inbound passengers and pick up passengers who are destined to areas outside City limits.

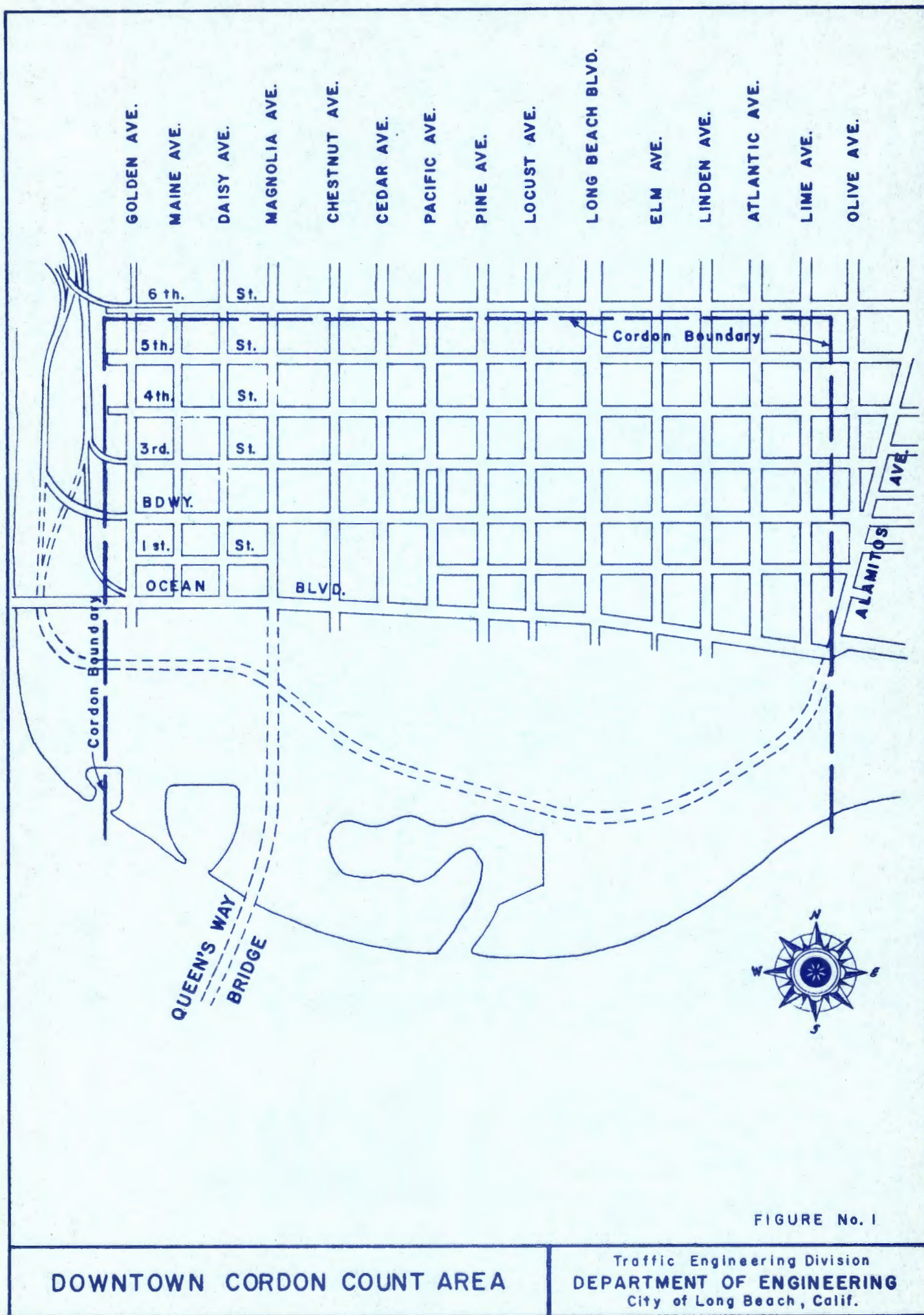
Figure 12 - only shows number of busses for each of the other lines serving the downtown area in a minor way. The number of passengers are totalled in the Tables 6 and 8.

Tables 1 and 2 - show vehicle and person data for the 14-hour survey period by street. This arrangement was done in order to get an idea about the distribution of traffic loads at the various boundaries.

Tables 3 and 4 - show vehicle and person data for all the streets summed together for each half hour period. The accumulation column prepared is the difference between incoming and outgoing traffic at the boundaries and will be used to determine parking demand in the downtown area.

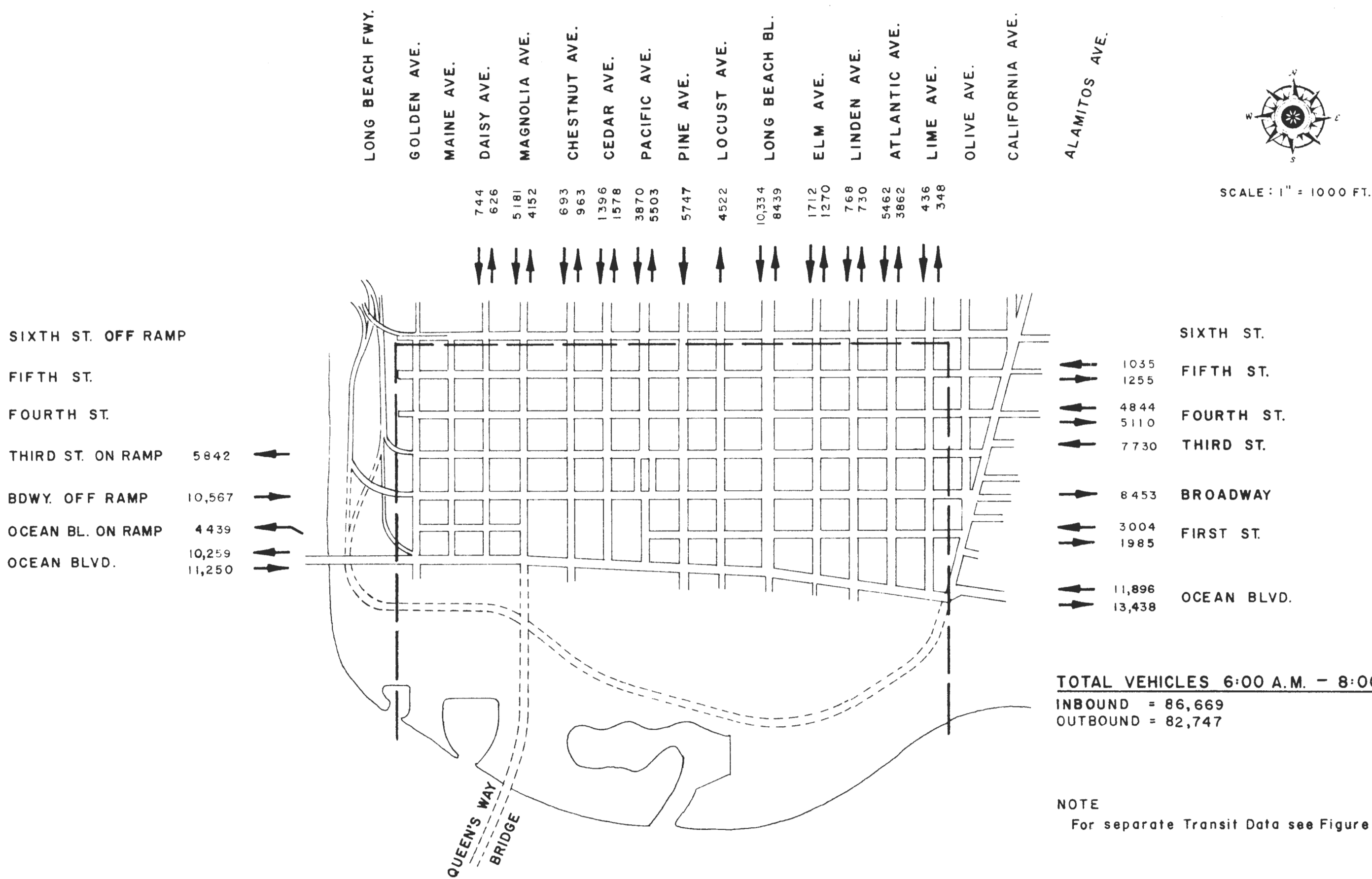
Tables 5 through 8 - contain only bus transit data arranged in a similar fashion to the preceding tables.

Table 9 - presents the capacity of the various street-crossing points at the Cordon Boundaries. Each capacity refers to the nearest controlled intersection outside or inside the boundary line. The intersections were chosen in such a manner that it was clear they controlled the amount of flow across the boundary. All calculations were based on the 1965 Highway Capacity Manual and assumed a continuous demand throughout the Peak Hour, i.e., Load Factor = 0.9 and Peak Hour Factor = 0.95. The capacity computed was compared with the existing volumes to yield volume-capacity ratios and level of service designations as portrayed on Figure 3-B.



DOWNTOWN CORDON COUNT AREA

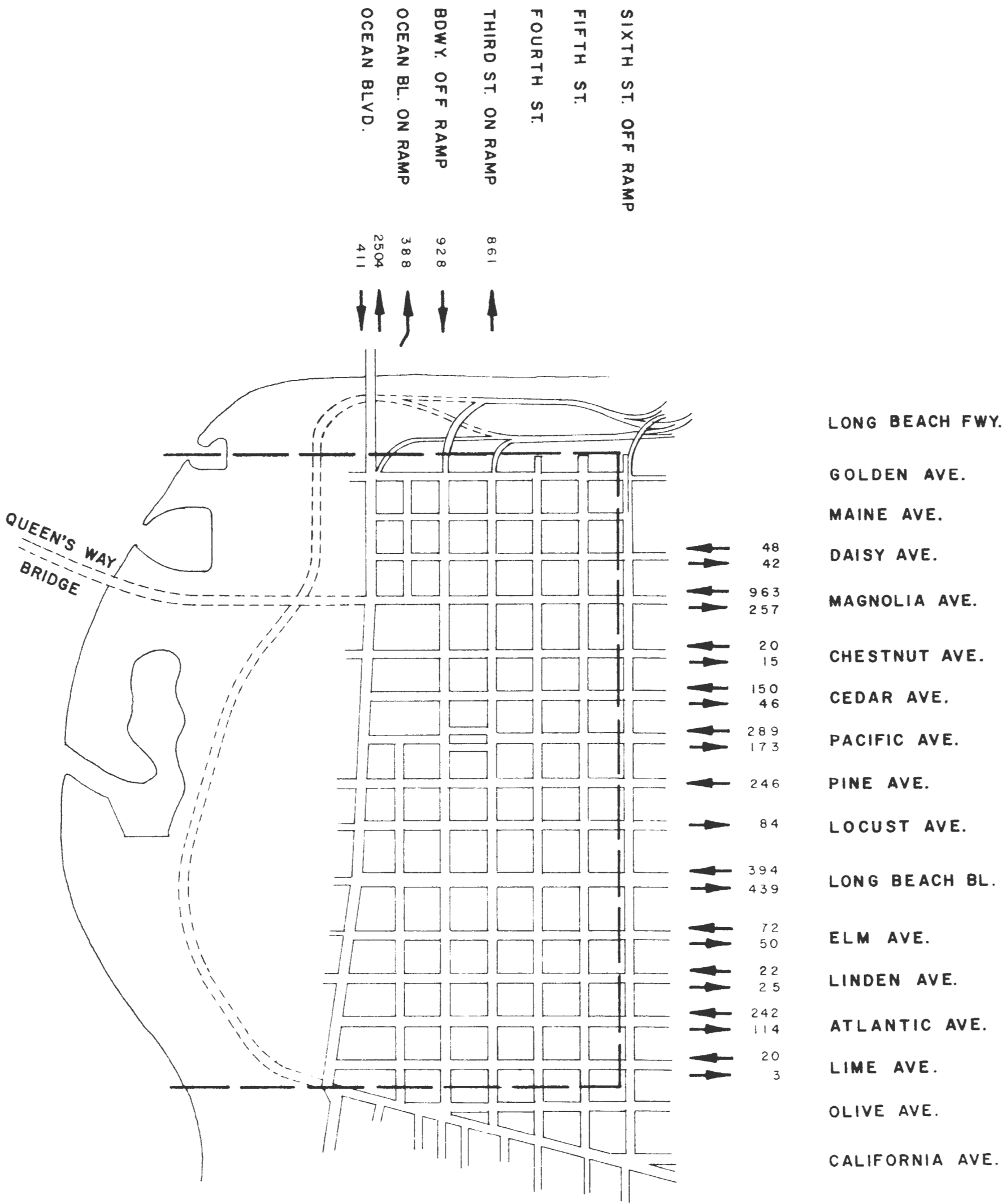
Traffic Engineering Division
DEPARTMENT OF ENGINEERING
City of Long Beach, Calif.



TOTAL VEHICLES for DOWNTOWN LONG BEACH CORDON COUNT, MAY 1970

Traffic Engineering Division
 DEPARTMENT OF ENGINEERING
 City of Long Beach, Calif.

FIGURE No. 2-A



TOTAL VEHICLES 7:00 A.M. - 8:00 A.M.
 INBOUND = 8213
 OUTBOUND = 5710

SCALE: 1" = 1000 FT.

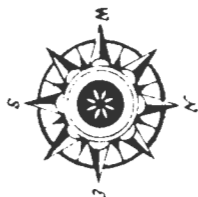
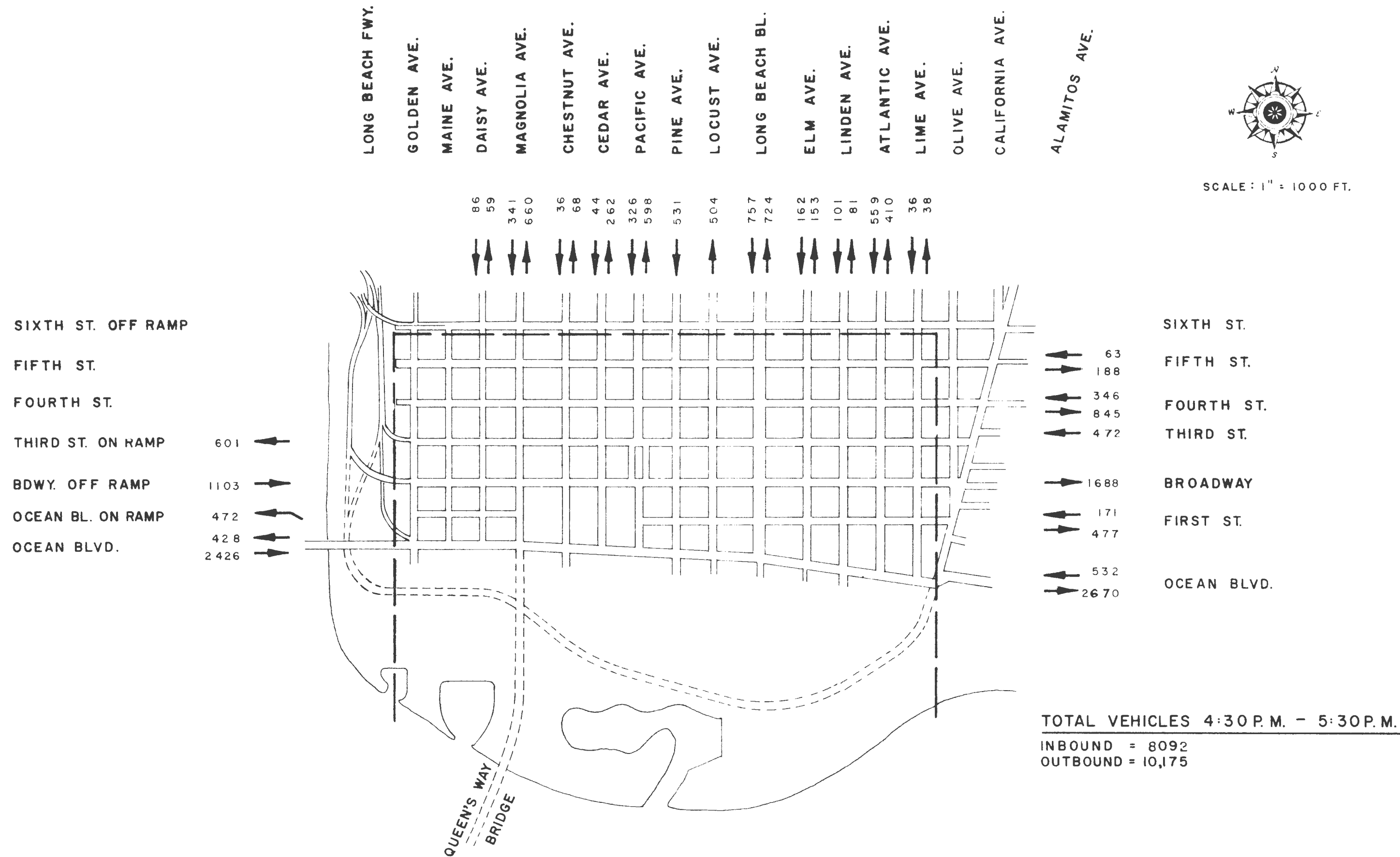


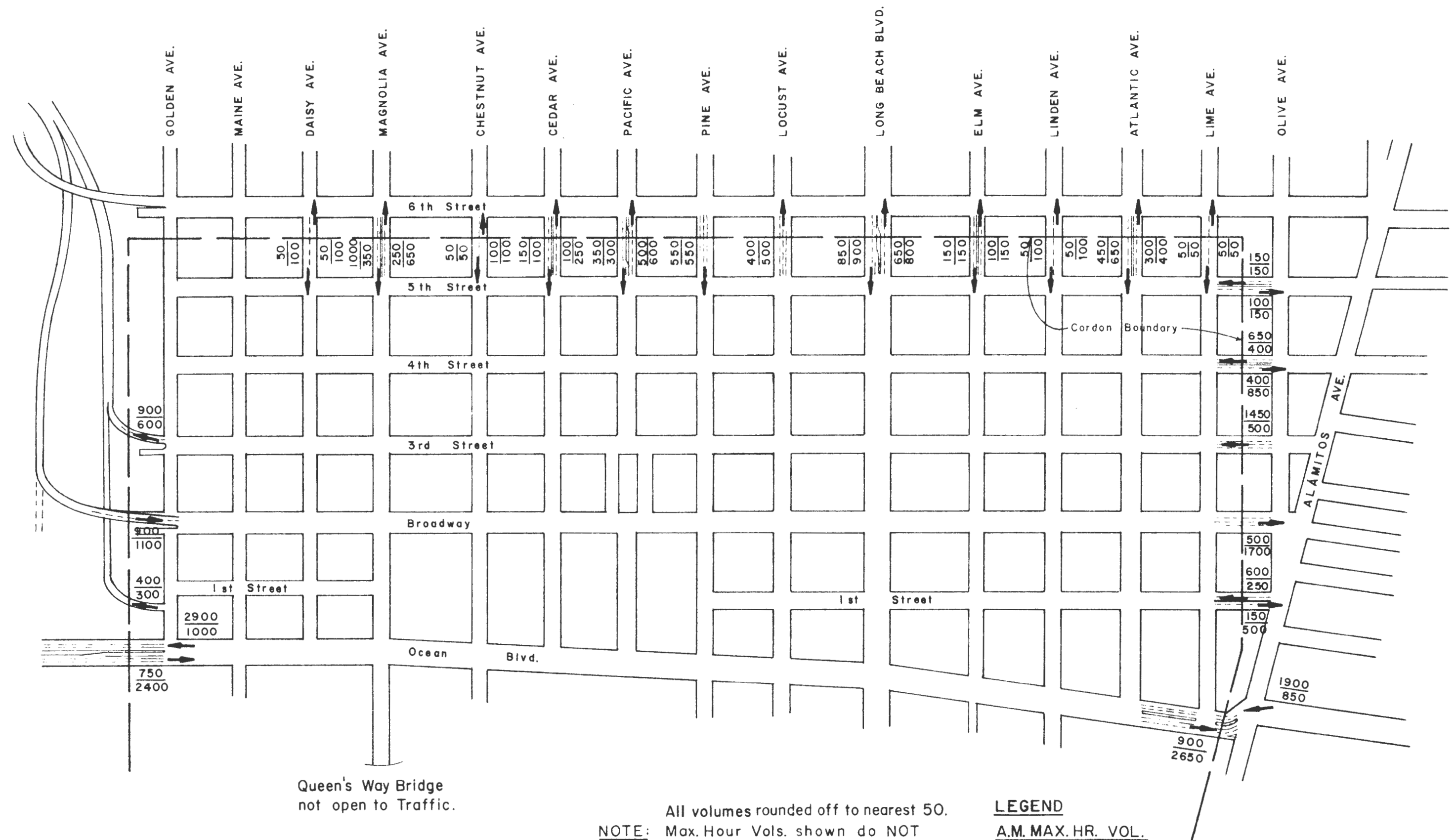
FIGURE No. 2 - B

A.M. PEAK HR. VEHICLES for DOWNTOWN LONG BEACH CORDON COUNT, MAY 1970

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 DEPARTMENT OF ENGINEERING
 City of Long Beach, Calif.



P.M. PEAK HR. VEHICLES for DOWNTOWN LONG BEACH CORDON COUNT, MAY 1970



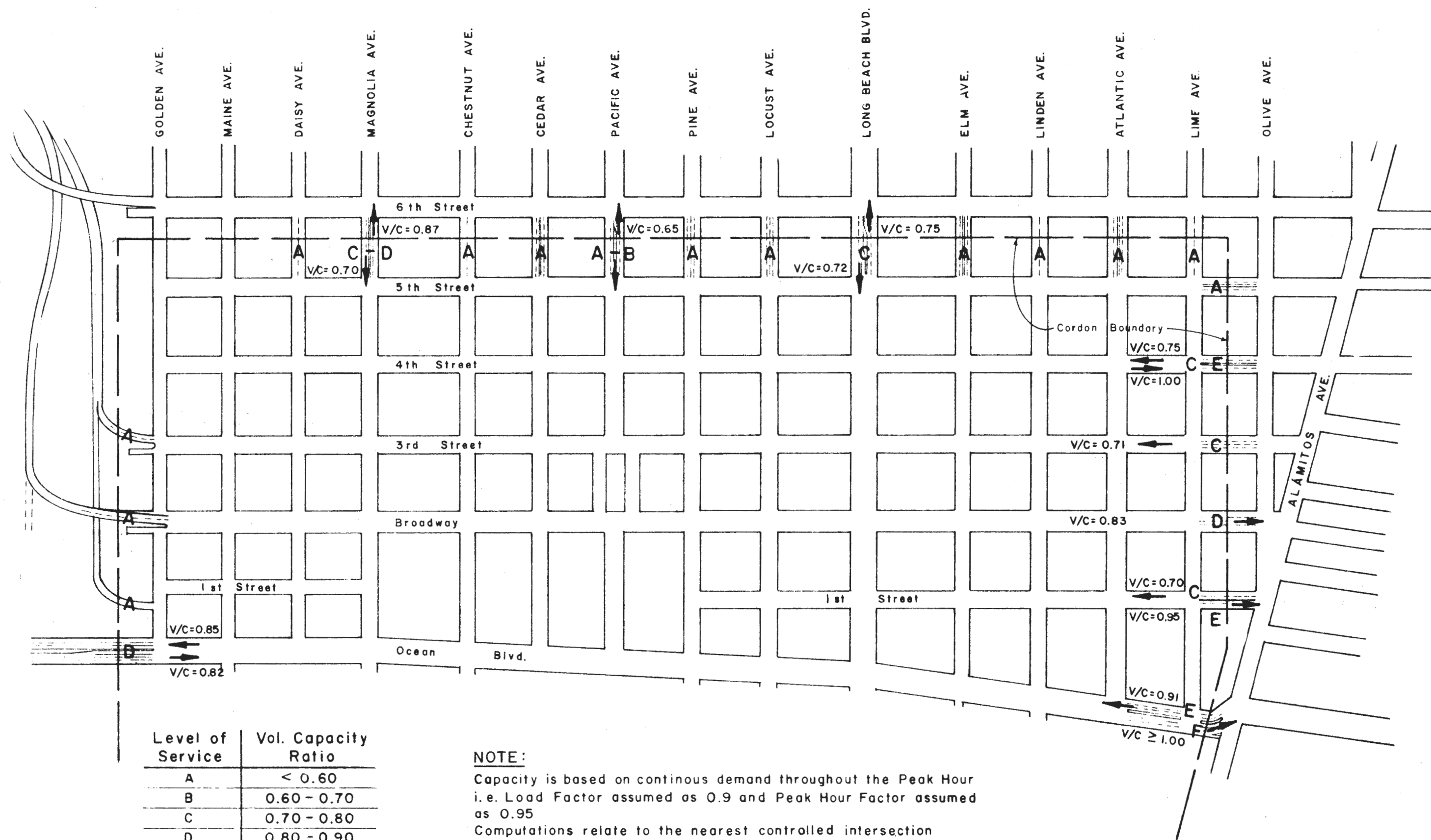
NOTE: All volumes rounded off to nearest 50.
Max. Hour Vols. shown do NOT coincide for each direction i.e. Max. A.M. Hr. N/B Pacific Ave. occurs at 11-12 A.M. while S/B occurs at 8:30-9:30 A.M.

LEGEND
A.M. MAX. HR. VOL.
P.M. MAX. HR. VOL.

A.M. - P.M. MAX. HOUR VOLUMES FOR STREETS CROSSING CORDON BOUNDARY

Traffic Engineering Division
DEPARTMENT OF ENGINEERING
City of Long Beach, Calif.

FIGURE No. 3-A



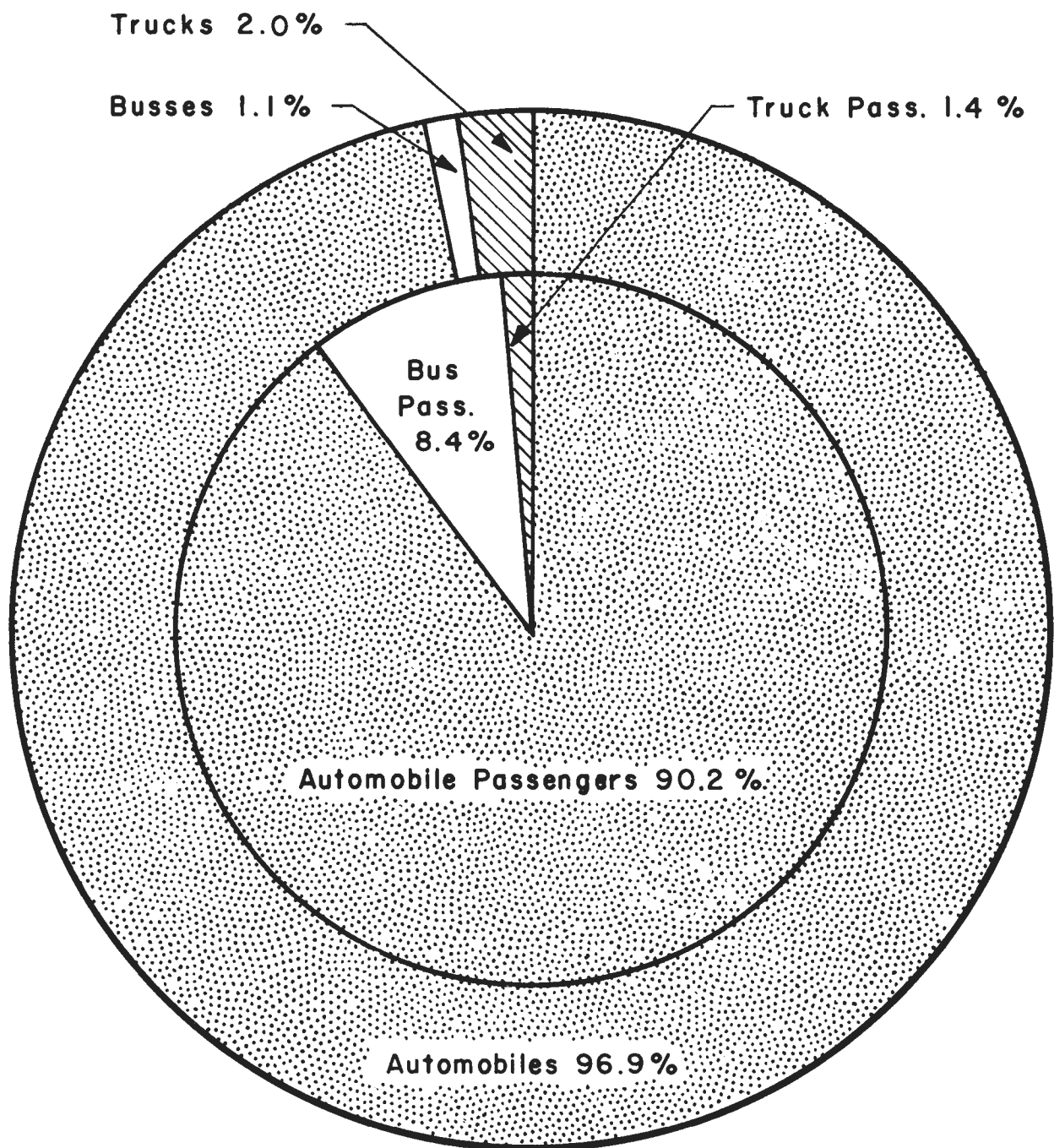
Level of Service	Vol. Capacity Ratio
A	< 0.60
B	0.60 - 0.70
C	0.70 - 0.80
D	0.80 - 0.90
E	0.90 - 1.00
F	> 1.00

NOTE:
 Capacity is based on continuous demand throughout the Peak Hour i.e. Load Factor assumed as 0.9 and Peak Hour Factor assumed as 0.95
 Computations relate to the nearest controlled intersection approach at the Cordon Boundary except for the Freeway - Ramps.
 Level of Service D is generally considered acceptable in Downtown Areas in the Peak Hours.

FIGURE No.3-B

VOLUME - CAPACITY RATIOS AND LEVEL OF TRAFFIC SERVICE FOR STREETS CROSSING CORDON BOUNDARY

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 DEPARTMENT OF ENGINEERING
 City of Long Beach, Calif.



NOTES:

1. Number of persons walking to and from the CORDON AREA ; not part of study.
2. Assumed each truck had driver only.
3. Passenger Cars and Trucks include some through traffic.

FIGURE No. 4

**VEHICLES AND PASSENGERS
ENTERING CORDON AREA**

Traffic Engineering Division
DEPARTMENT OF ENGINEERING
City of Long Beach, Calif.

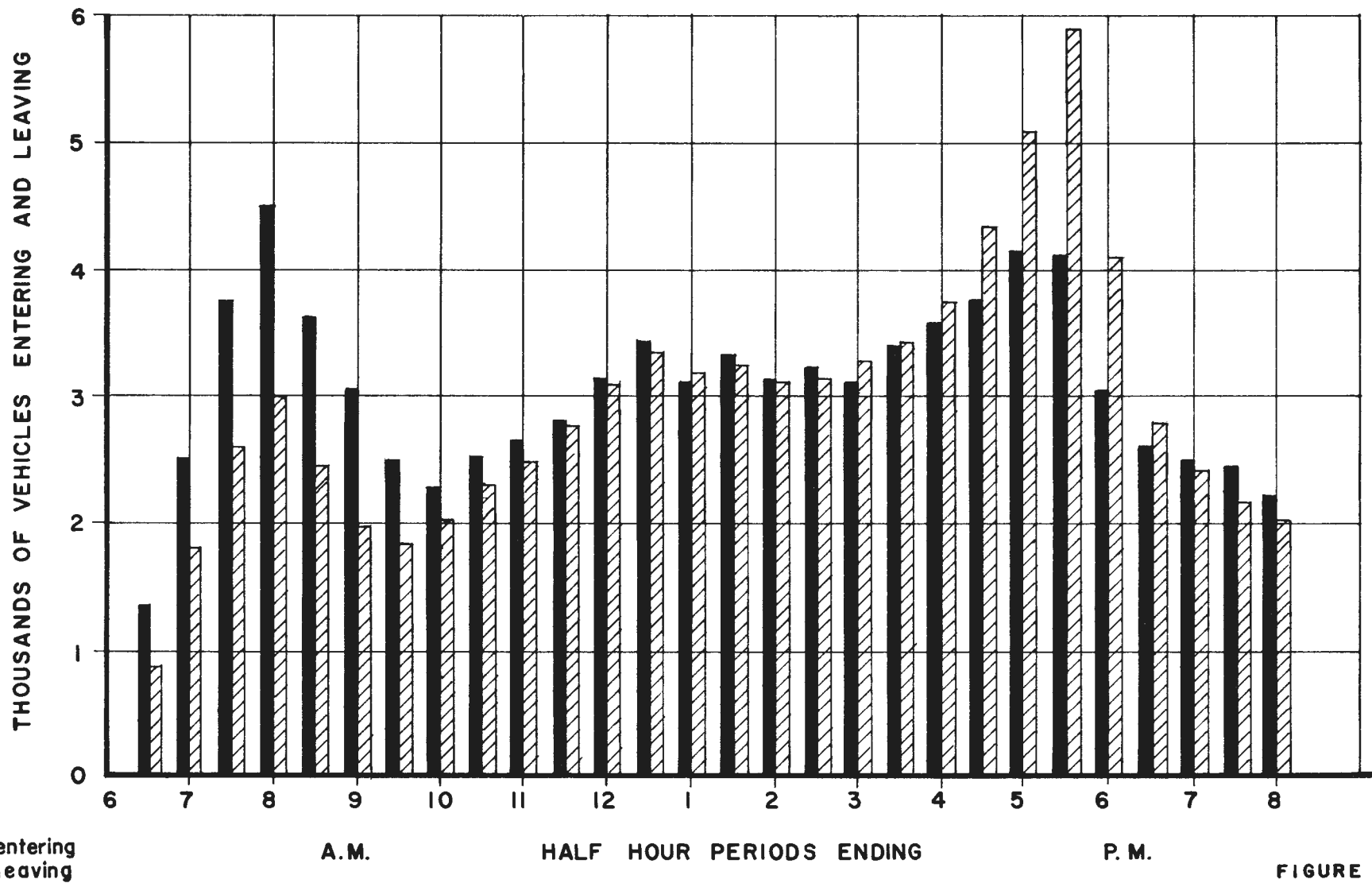
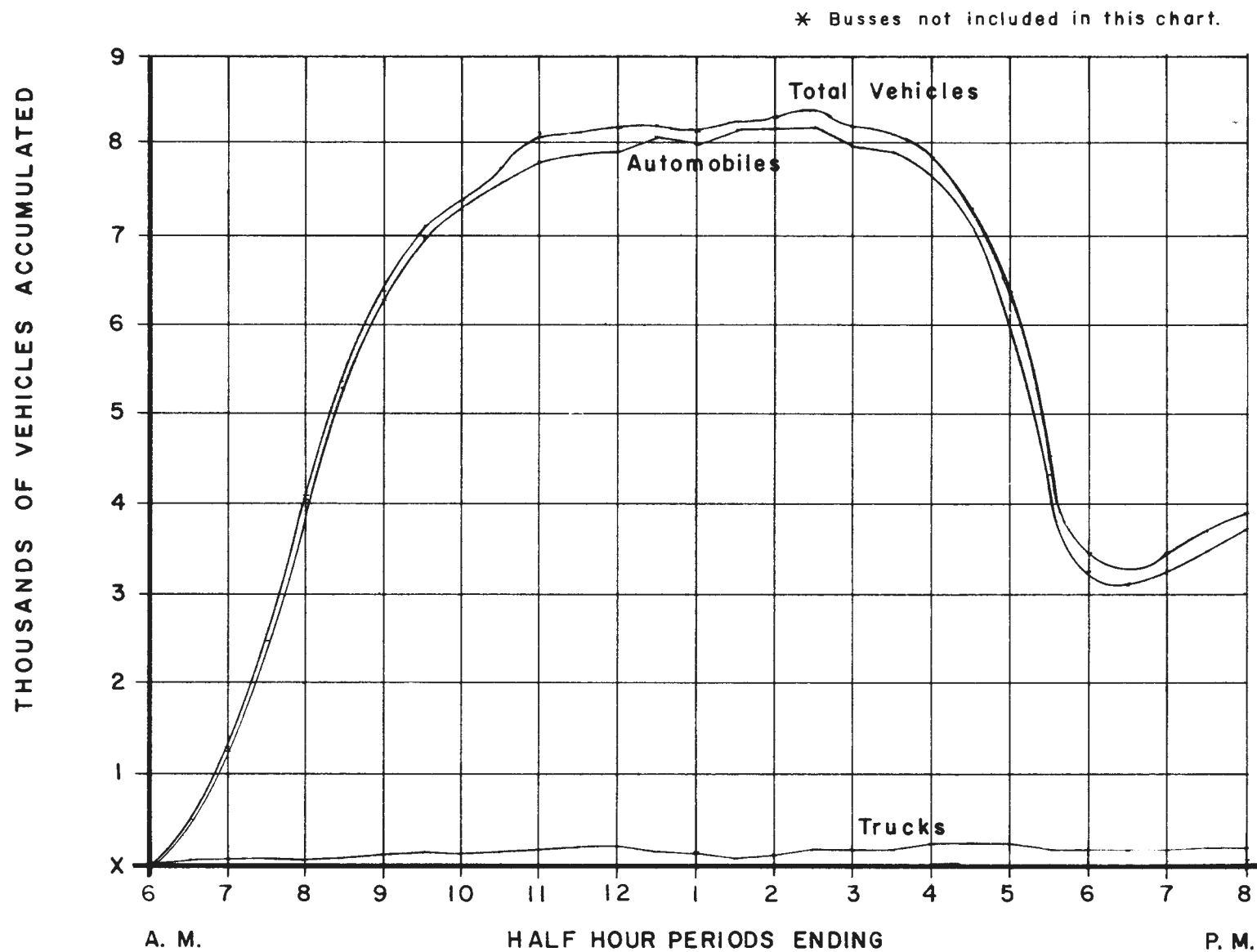


FIGURE No. 5

VEHICLES ENTERING and LEAVING CORDON AREA, May 1970

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DEPARTMENT OF ENGINEERING
City of Long Beach, Calif.



X - Number of Vehicles within Cordon Area presently unknown.

FIGURE No. 6

VEHICLES ACCUMULATED IN CORDON AREA, MAY 1970

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City of Long Beach, Calif.

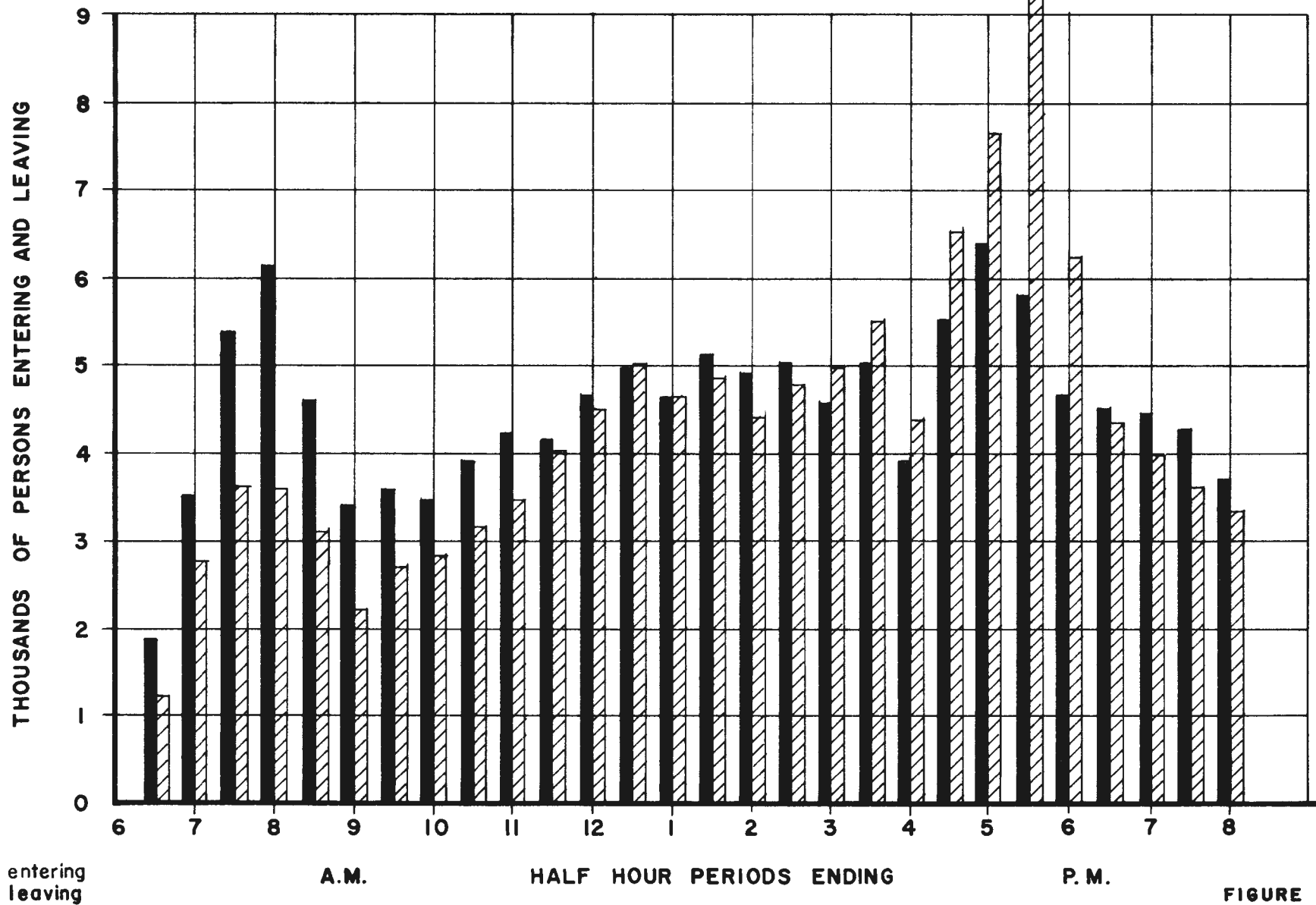
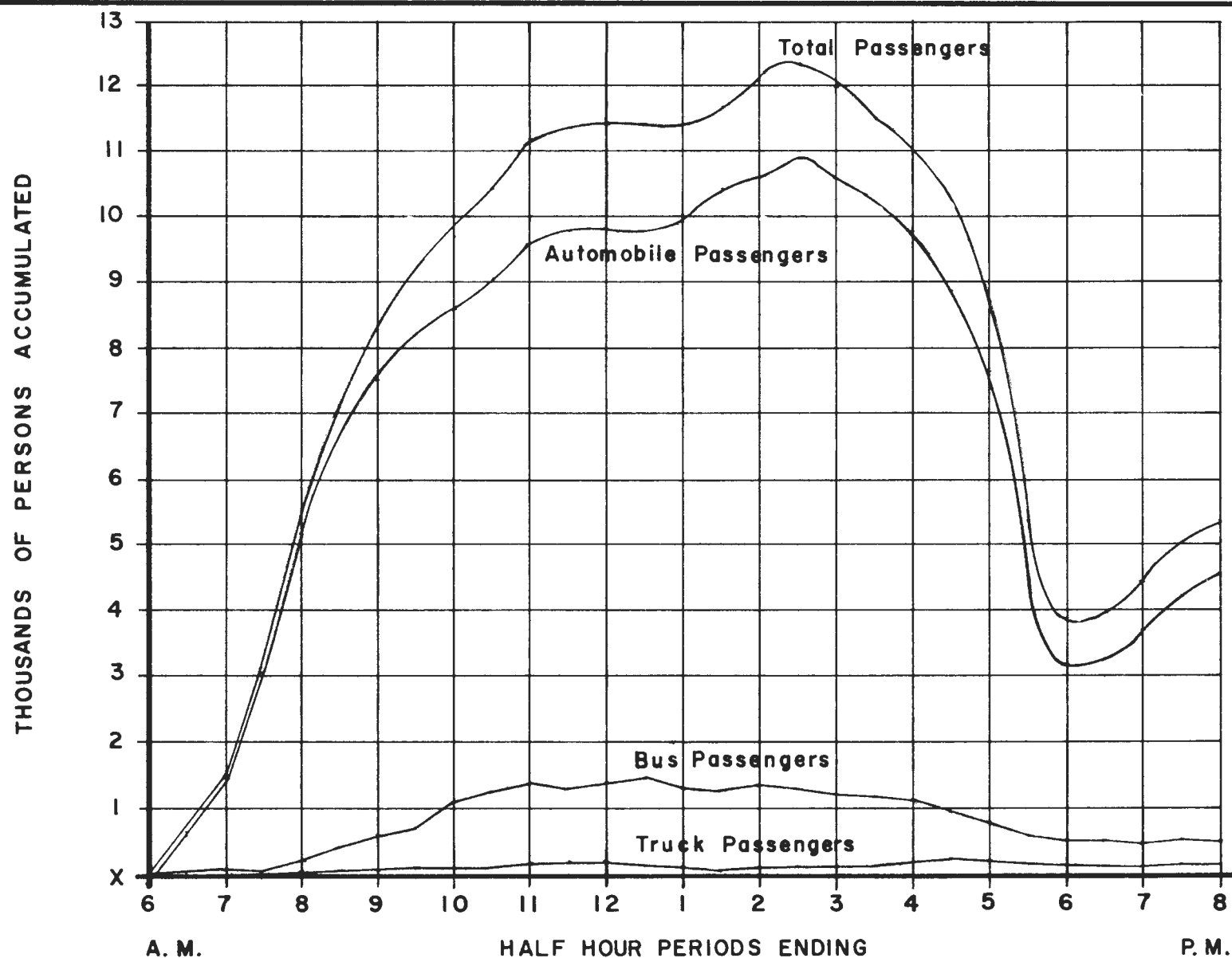


FIGURE No.7

PERSONS ENTERING and LEAVING CORDON AREA, May 1970

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 DEPARTMENT OF ENGINEERING
 City of Long Beach, Calif.

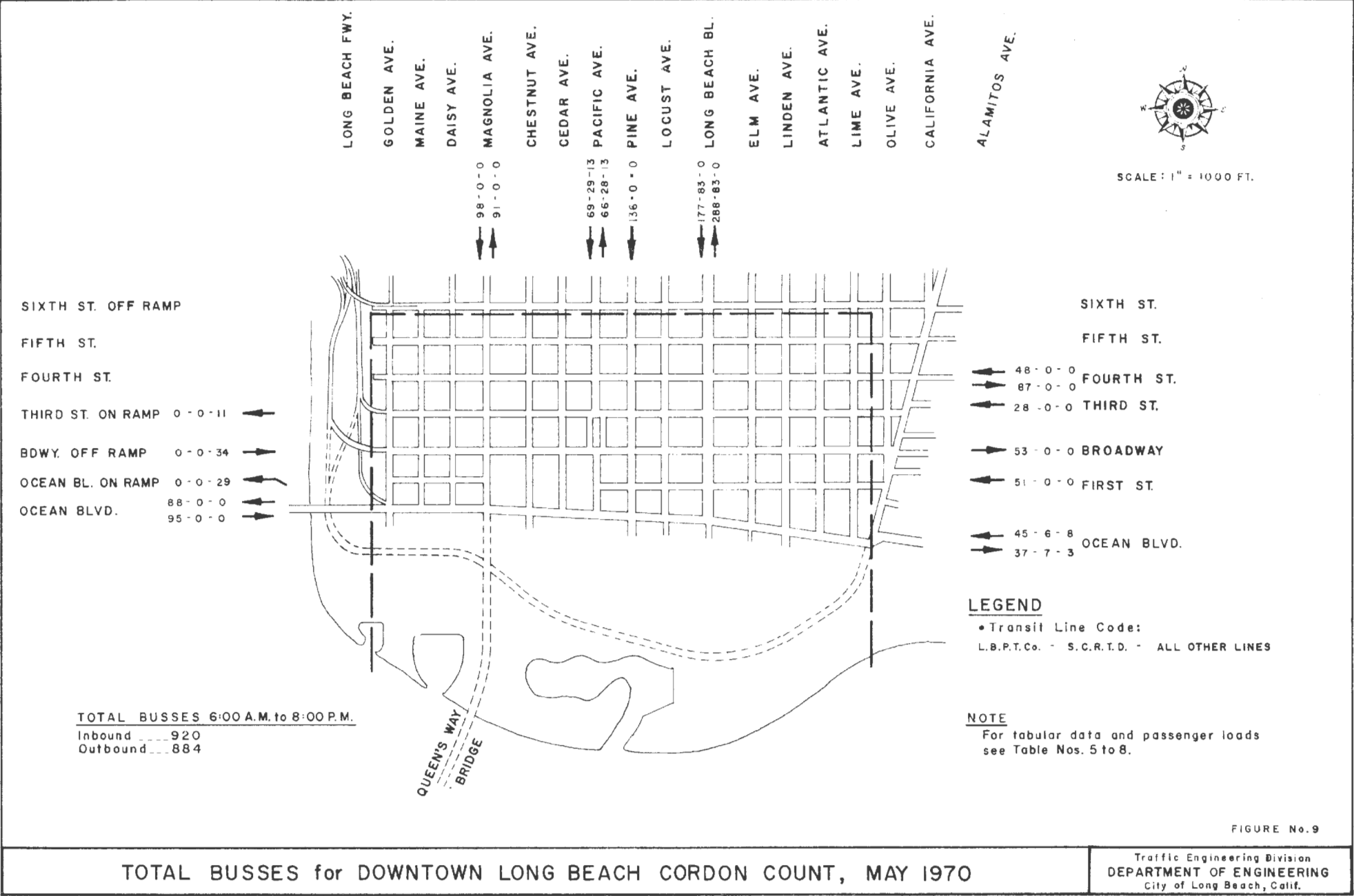


X - Persons within Cordon Area presently unknown.

FIGURE No. 8

PERSONS ACCUMULATED IN CORDON AREA, MAY 1970

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City of Long Beach, Calif.



L.B. PUBLIC TRANSPORTATION CO. BUS ROUTES

Traffic Engineering Division
DEPARTMENT OF ENGINEERING
City of Long Beach, Calif.

LONG BEACH FWY.
GOLDEN AVE.
MAINE AVE.
DAISY AVE.
MAGNOLIA AVE.
CHESTNUT AVE.
CEDAR AVE.
PACIFIC AVE.
PINE AVE.
LOCUST AVE.
LONG BEACH BL.
ELM AVE.
LINDEN AVE.
ATLANTIC AVE.
LIME AVE.
OLIVE AVE.
CALIFORNIA AVE.

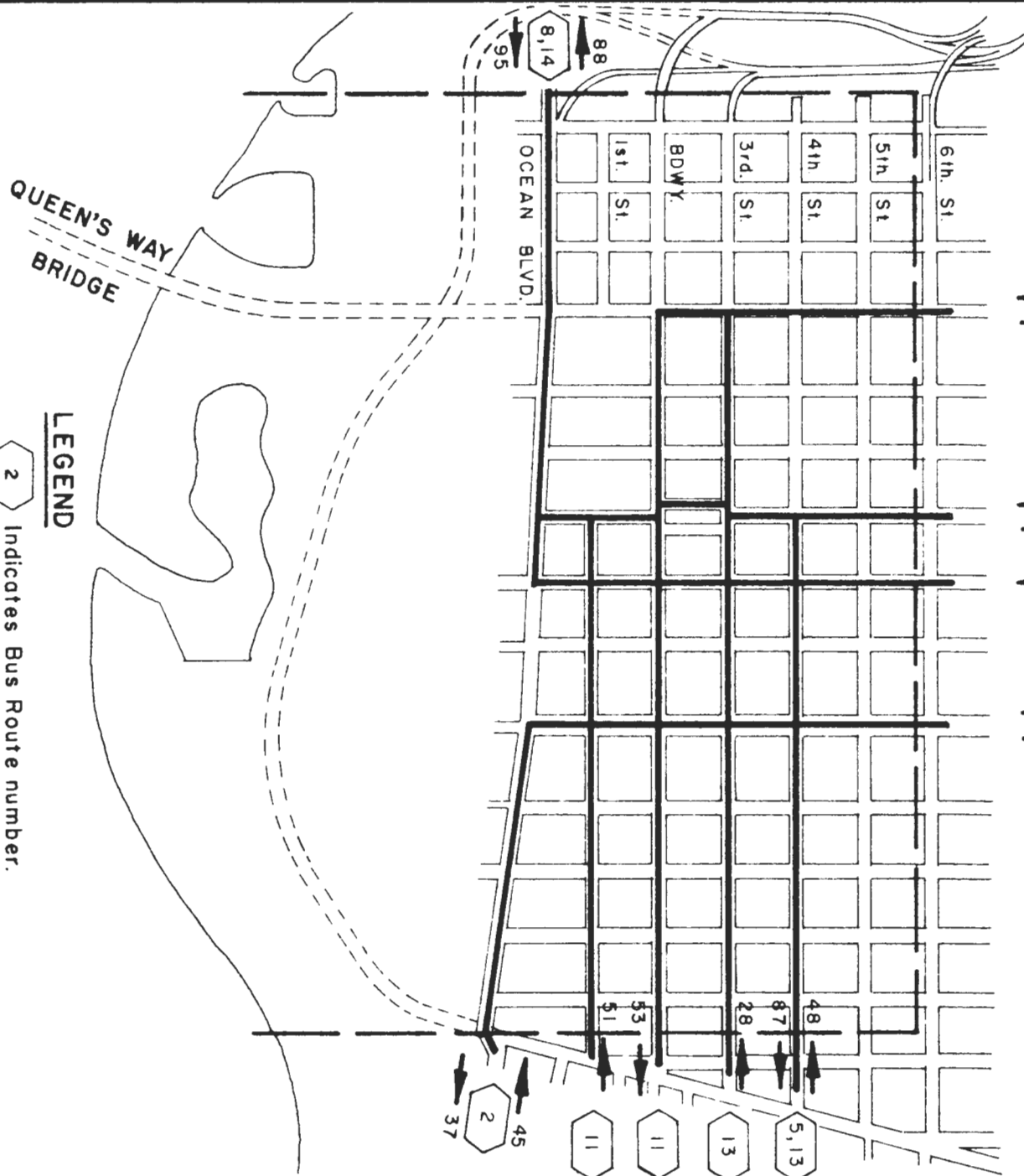


FIGURE No. 10

LONG BEACH FWY.

GOLDEN AVE.

MAINE AVE.

DAISY AVE.

MAGNOLIA AVE.

CHESTNUT AVE.

CEDAR AVE.

PACIFIC AVE.

PINE AVE.

LOCUST AVE.

LONG BEACH BL.

ELM AVE.

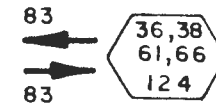
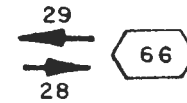
LINDEN AVE.

ATLANTIC AVE.

LIME AVE.

OLIVE AVE.

CALIFORNIA AVE.



QUEEN'S WAY
BRIDGE

6th St.
5th St.
4th St.
3rd St.
BDWY.
1st St.
OCEAN BLVD.

LEGEND



Indicates Bus Route number.



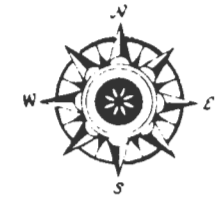
Indicates Bus Volume.

FIGURE No. 11

SO. CALIF. RAPID TRANSIT DISTRICT
BUS ROUTES

Traffic Engineering Division
DEPARTMENT OF ENGINEERING
City of Long Beach, Calif.

LONG BEACH FWY.
GOLDEN AVE.
MAINE AVE.
DAISY AVE.
MAGNOLIA AVE.
CHESTNUT AVE.
CEDAR AVE.
PACIFIC AVE.
PINE AVE.
LOCUST AVE.
LONG BEACH BL.
ELM AVE.
LINDEN AVE.
ATLANTIC AVE.
LIME AVE.
OLIVE AVE.
CALIFORNIA AVE.
ALAMITOS AVE.



SCALE: 1" = 1000 FT.

SIXTH ST. OFF RAMP

FIFTH ST.

FOURTH ST.

THIRD ST. ON RAMP 0-0-0-5-6

BDWY. OFF RAMP 27-0-2-0-5

OCEAN BL. ON RAMP 27-0-2-0-0

OCEAN BLVD.

SIXTH ST.

FIFTH ST.

FOURTH ST.

THIRD ST.

BROADWAY

FIRST ST.

OCEAN BLVD.

Greyhound Depot

Continental Depot

* Commuter Bus Service only.

LEGEND

AIRPORT SERVICE - TORRANCE MUNICIPAL - UNION PACIFIC - WESTERN GREYHOUND - CONTINENTAL TRAILWAYS

①

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④

⑤

ALL OTHER BUS ROUTES

FIGURE No. 12

Traffic Engineering Division
DEPARTMENT OF ENGINEERING
City of Long Beach, Calif.

SUMMARY OF VEHICLES BY LOCATION

TABLE NO. 1

DOWNTOWN LONG BEACH, MAY 1970 6AM - 8PM

	PASSENGER CARS		TRUCKS		BUSES		TOTAL VEHICLES	
	IN	OUT	IN	OUT	IN	OUT	IN	OUT
NORTH BOUNDARY								
NORTH OF 5TH ST ON								
Daisy Avenue	744	626	0	0	0	0	744	626
Magnolia Avenue	4943	3897	140	164	98	91	5181	4152
Chestnut Avenue	693	963	0	0	0	0	693	963
Cedar Avenue	1396	1578	0	0	0	0	1396	1578
Pacific Avenue	3656	5260	103	136	111	107	3870	5503
Pine Avenue	5454	0	157	0	136	0	5747	0
Locust Avenue	0	4454	0	68	0	0	0	4522
Long Beach Blvd	9927	7852	147	216	260	371	10334	8439
Elm Avenue	1610	1217	102	53	0	0	1712	1270
Linden Avenue	768	730	0	0	0	0	768	730
Atlantic Avenue	5304	3726	158	136	0	0	5462	3862
Lime Avenue	436	348	0	0	0	0	436	348
Sub Total	34931	30651	807	773	605	569	36343	31993
EAST BOUNDARY								
EAST OF LIME AVENUE ON								
5th Street	1035	1255	0	0	0	0	1035	1255
4th Street	4630	4901	166	122	48	87	4844	5110
3rd Street	7563	0	139	0	28	0	7730	0
Broadway	0	8177	0	223	0	53	0	8453
1st Street	2876	1943	77	42	51	0	3004	1985
Ocean Blvd	11704	13289	133	100	59	47	11896	13436
Sub Total	27808	29565	515	487	186	187	28509	30239
WEST BOUNDARY								
WEST OF GOLDEN AVE ON								
Ocean Blvd	10995	10046	160	125	95	88	11250	10259
Ocean Blvd Fwy ON ramp	0	4349	0	63	0	29	0	4441
Broadway OFF ramp	10245	0	288	0	34	0	10567	0
3rd St ON ramp	0	5668	0	136	0	11	0	5815
Sub Total	21240	20123	448	324	129	128	21817	20515
GRAND TOTAL	83979	80279	1770	1584	920	884	86669	82747

TABLE NO. 1

SUMMARY OF PERSONS BY LOCATION
DOWNTOWN LONG BEACH, MAY 1970 6AM - 8PM

TABLE NO. 2

	AUTO PASSENGERS		TRUCK PASSENGERS		BUS PASSENGERS		TOTAL PERSONS	
	IN	OUT	IN	OUT	IN	OUT	IN	OUT
NORTH BOUNDARY								
NORTH OF 5TH ST ON								
Daisy Avenue	994	918	0	0	0	0	994	918
Magnolia Avenue	6932	5151	140	164	1079	1003	8151	6318
Chestnut Avenue	950	1330	0	0	0	0	950	1330
Cedar Avenue	2002	2105	0	0	0	0	2002	2105
Pacific Avenue	5054	7277	103	136	1187	1145	6344	8558
Pine Avenue	7821	0	157	0	1424	0	9245	0
Locust Avenue	0	6160	0	68	0	0	0	6228
Long Beach Boulevard	13743	10881	147	216	2697	4328	16587	15425
Elm Avenue	2122	1745	102	53	0	0	2224	1798
Linden Avenue	1005	917	0	0	0	0	1005	917
Atlantic Avenue	6788	5024	158	136	0	0	6946	5160
Lime Avenue	555	488	0	0	0	0	555	488
Sub Total	47966	41996	807	773	6387	6476	55160	49245
EAST BOUNDARY								
EAST OF LIME AVE ON								
5th Street	1238	1687	0	0	0	0	1238	1687
4th Street	6232	6477	166	122	987	1308	7385	7907
3rd Street	9818	0	139	0	447	0	10404	0
Broadway	0	10348	0	223	0	754	0	11325
1st Street	3812	2825	77	42	675	0	4564	2867
Ocean Blvd	16243	18629	133	100	609	514	16985	19243
Sub Total	37343	39966	515	487	2718	2576	40576	43029
WEST BOUNDARY								
WEST OF GOLDEN AVENUE ON								
Ocean Boulevard	16299	14892	160	125	1242	782	17701	15799
Ocean Blvd Frwy ON ramp	0	6020	0	63	0	107	0	6190
Broadway OFF ramp	12768	0	288	0	267	0	13323	0
3rd Street ON ramp	0	6912	0	136	0	106	0	7154
Sub Total	29067	27824	448	324	1509	995	31024	29143
GRAND TOTAL	114376	109786	1770	1584	10614	10047	126760	121417

TABLE NO. 2

SUMMARY OF VEHICLES BY HALF HOUR PERIODS
DOWNTOWN LONG BEACH, MAY 1970
6AM - 8PM

TABLE NO. 3

TIME PERIOD ENDING	PASSENGER CARS			TRUCKS			BUSES			TOTAL VEHICLES		
	TOTALS Inbound	TOTALS Outbound	ACCUM	TOTALS Inbound	TOTALS Outbound	ACCUM	TOTALS Inbound	TOTALS Outbound	ACCUM	Inbound	Outbound	ACCUM
AM 630	1358	851	507	46	13	33	24	25	-1	1428	889	539
700	2547	1811	1243	50	24	59	28	34	-7	2625	1869	1295
730	3832	2617	2458	15	20	54	33	33	-7	3880	2670	2505
800	4493	2918	4033	44	47	51	37	32	-2	4574	2997	4082
830	3602	2343	5292	71	48	74	38	36	0	3711	2427	5366
900	2907	1909	6290	84	54	104	36	33	3	3027	1996	6397
930	2422	1736	6976	96	66	134	30	32	1	2548	1834	7111
1000	2152	1843	7285	112	132	114	35	30	6	2299	2005	7405
1030	2568	2247	7606	76	46	144	31	34	3	2675	2327	7753
1100	2657	2421	7842	108	63	189	32	28	7	2797	2512	8038
1130	2703	2653	7892	100	86	203	30	36	1	2833	2775	8096
NOON 1200	3056	3023	7925	67	68	202	32	29	4	3155	3120	8131
1230	3306	3193	8038	62	120	144	30	34	0	3398	3347	8182
100	3000	3056	7982	91	110	125	32	31	1	3123	3197	8107
130	3206	3042	8146	79	131	73	31	31	1	3316	3204	8219
200	3001	3014	8133	121	83	111	34	29	6	3156	3126	8248
230	3056	3028	8161	114	48	177	36	35	7	3206	3111	8343
300	2977	3151	7987	72	90	159	31	31	7	3080	3272	8151
330	3259	3346	7900	80	70	169	33	36	4	3372	3452	8071
400	3465	3707	7658	81	39	211	37	35	6	3583	3781	7873
430	3671	4268	7061	90	46	255	37	37	6	3798	4351	7320
500	4073	5007	6127	37	73	219	36	32	10	4146	5112	6354
530	4029	5833	4323	13	35	197	37	40	7	4079	5908	4525
600	2974	4050	3247	8	31	174	40	30	17	3022	4111	3436
630	2555	2723	3078	19	25	168	42	33	26	2616	2781	3271
700	2509	2345	3242	8	9	167	29	27	28	2546	2381	3436
730	2374	2141	3475	21	4	184	27	23	32	2422	2168	3690
PM 800	2228	2002	3700	5	3	186	22	18	36	2255	2023	3922
TOTAL	83979	80279		1770	1584		920	884		86669	82747	

TABLE NO. 3

SUMMARY OF PERSONS BY HALF HOUR PERIODS
DOWNTOWN LONG BEACH, MAY 1970

TABLE NO. 4

TIME PERIOD ENDING	AUTO PASSENGERS			TRUCK PASSENGERS 6AM - 8PM			BUS PASSENGERS			TOTAL PERSONS		
	Inbound	Outbound	ACCUM	Inbound	Outbound	ACCUM	Inbound	Outbound	ACCUM	Inbound	Outbound	ACCUM
AM 630	1716	1074	642	46	13	33	174	173	1	1936	1260	676
700	3322	2478	1486	50	24	59	293	344	-50	3665	2846	1495
730	4891	3340	3037	15	20	54	441	367	24	5347	3727	3115
800	5497	3385	5149	44	47	51	524	321	227	6065	3753	5427
830	4193	2782	6560	71	48	74	511	291	447	4775	3121	7081
900	2907	1949	7518	84	54	104	404	210	641	3395	2213	8263
930	3128	2430	8216	96	66	134	392	239	794	3616	2735	9144
1000	2864	2533	8547	112	132	114	502	212	1084	3478	2877	9745
1030	3462	2956	9053	76	46	144	395	258	1221	3933	3260	10418
1100	3705	3155	9603	108	63	189	449	305	1365	4262	3523	11157
1130	3771	3558	9816	100	86	203	297	375	1287	4168	4019	11306
NOON 1200	4178	4150	9844	67	68	202	422	320	1389	4667	4538	11435
1230	4534	4535	9843	62	120	144	389	356	1422	4985	5011	11409
100	4327	4218	9952	91	110	125	305	435	1292	4723	4763	11369
130	4672	4215	10409	79	131	73	359	422	1229	5110	4768	11711
200	4200	4009	10600	121	83	111	489	357	1361	4810	4449	12072
230	4486	4184	10902	114	48	177	420	486	1295	5020	4718	12374
300	4186	4471	10617	72	90	159	350	428	1217	4608	4989	11993
330	4483	4942	10158	80	70	169	453	512	1158	5016	5524	11485
400	3365	3707	9816	81	39	211	486	526	1118	3932	4272	11145
430	4987	5866	8937	90	46	255	446	601	963	5523	6513	10155
500	5726	6970	7693	37	73	219	554	656	861	6317	7699	8773
530	5410	8596	4507	13	35	197	424	643	642	5847	9274	5346
600	4393	5767	3133	8	31	174	337	430	549	4738	6228	3856
630	4143	4033	3243	19	25	168	308	286	571	4470	4344	3982
700	4225	3752	3716	8	9	167	180	221	530	4413	3982	4413
730	4042	3527	4231	21	4	184	202	140	592	4265	3671	5007
PM 800	3563	3204	4590	5	3	186	108	133	567	3676	3340	5343
TOTAL	114376	109786		1770	1584		10614	10047		126760	121417	

TABLE NO. 4

TABLE NO. 5

SUMMARY OF BUSES BY LOCATION
DOWNTOWN LONG BEACH, MAY 1970 6AM - 8PM

NORTH BOUNDARY NORTH OF 5TH ST	L.B.P.T. Co		S.C.R.T.D.		ALL OTHER LINES		TOTAL BUSES	
	IN	OUT	IN	OUT	IN	OUT	IN	OUT
Magnolia Avenue	98	91	0	0	0	0	98	91
Pacific Avenue	69	66	29	28	13	13	111	107
Pine Avenue	136	0	0	0	0	0	136	0
Long Beach Boulevard	177	288	83	83	0	0	260	371
Sub Total	480	445	112	111	13	13	605	569

EAST BOUNDARY
EAST OF LIME AVE ON

4th Street	48	87	0	0	0	0	48	87
3rd Street	28	0	0	0	0	0	28	0
Broadway	0	53	0	0	0	0	0	53
1st Street	51	0	0	0	0	0	51	0
Ocean Boulevard	45	37	6	7	8	3	59	47
Sub Total	172	177	6	7	8	3	186	187

WEST BOUNDARY
WEST OF GOLDEN AVENUE ON

Ocean Boulevard	95	88	0	0	0	0	95	88
Ocean Blvd Fwy ON ramp	0	0	0	0	0	29	0	29
Broadway	0	0	0	0	34	0	34	0
3rd Street	0	0	0	0	0	11	0	11
Sub Total	95	88	0	0	34	40	129	128

GRAND TOTAL	747	710	118	118	55	56	920	884
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TABLE NO. 5

SUMMARY OF BUS PASSENGERS BY LOCATION

TABLE No. 6

DOWNTOWN LONG BEACH, MAY 1970 6AM - 8PM

NORTH BOUNDARY NORTH OF 5TH ST ON	L.B.P.T. CO		S.C.R.T.D.		ALL OTHER LINES		TOTAL PASSENGERS	
	IN	OUT	IN	OUT	IN	OUT	IN	OUT
Magnolia Avenue	1079	1003	0	0	0	0	1079	1003
Pacific Avenue	857	803	200	212	130	130	1187	1145
Pine Avenue	1424	0	0	0	0	0	1424	0
Long Beach Blvd	2047	3541	650	787	0	0	2697	4328
Sub Total	5407	5347	850	999	130	130	6387	6476

EAST BOUNDARY EAST OF LIME AVE ON

4th Street	987	1308	0	0	0	0	987	1308
3rd Street	447	0	0	0	0	0	447	0
Broadway	0	754	0	0	0	0	0	754
1st Street	675	0	0	0	0	0	675	0
Ocean Blvd	469	421	60	73	80	20	609	514
Sub Total	2578	2483	60	73	80	20	2718	2576

WEST BOUNDARY WEST OF GOLDEN AVE ON

Ocean Blvd	1242	782	0	0	0	0	1242	782
Ocean Blvd Fwy ON ramp	0	0	0	0	0	107	0	107
Broadway	0	0	0	0	267	0	267	0
3rd Street	0	0	0	0	0	106	0	106
Sub Total	1242	782	0	0	267	213	1509	995

GRAND TOTAL	9227	8612	910	1072	447	363	10614	10047
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TABLE NO. 6

SUMMARY OF BUSES BY HALF HOUR PERIODS

TABLE No. 7

DOWNTOWN LONG BEACH, May 1970
6AM - 8PM

TIME PERIOD ENDING	L.B.P.T. Lines			S.C.R.T.D. Lines			All Other Lines			Total Busses		
	Inbound	Outbound	ACCUM	Inbound	Outbound	ACCUM	Inbound	Outbound	ACCUM	Inbound	Outbound	ACCUM
AM 630	20	19	1	2	6	-4	2	0	2	24	25	-1
700	26	25	2	2	6	-8	0	3	-1	28	34	-7
730	28	27	3	2	6	-12	3	0	2	33	33	-7
800	31	26	8	5	3	-10	1	3	0	37	32	-2
830	28	29	7	5	4	-9	5	3	2	38	36	0
900	30	26	11	4	5	-10	2	2	2	36	33	3
930	25	25	11	3	4	-11	2	3	1	30	32	1
1000	28	25	14	6	3	-8	1	2	0	35	30	-6
1030	25	26	13	3	6	-11	3	2	1	31	34	3
1100	25	23	15	6	3	-8	2	2	1	32	28	7
1130	24	28	11	3	6	-11	3	2	2	30	36	-1
NOON 1200	27	24	14	4	2	-9	1	3	0	32	29	4
1230	24	29	9	4	4	-9	2	1	1	30	34	0
100	27	23	13	4	6	-11	1	2	0	32	31	1
130	25	27	11	4	3	-10	2	1	1	31	31	1
200	27	24	14	6	3	-7	1	2	0	34	29	6
230	30	28	16	3	6	-10	4	1	3	36	35	7
300	24	24	16	6	3	-7	1	4	0	31	31	7
330	27	29	14	4	6	-9	2	1	1	33	36	4
400	33	30	17	3	3	-9	1	2	0	37	35	6
430	32	30	19	3	5	-11	2	2	0	37	37	6
500	29	28	20	5	2	-8	2	2	0	36	32	10
530	31	31	20	3	6	-11	3	3	0	37	40	7
600	32	25	27	7	3	-7	1	2	-1	40	30	17
630	29	24	32	8	6	-5	5	3	1	42	33	26
700	23	20	35	3	4	-6	1	3	-1	29	27	28
730	22	20	37	4	2	-4	1	1	-1	27	23	32
PM 800	15	15	37	6	2	0	1	1	-1	22	18	36
TOTALS	747	710		118	118		55	56		920	884	

TABLE NO. 7

SUMMARY OF BUS OCCUPANCY BY HALF HOUR PERIODS

TABLE NO. 8

DOWNTOWN LONG BEACH, MAY 1970
6AM - 8PM

TIME PERIOD ENDING	L.B.P.T. Lines			S.C.R.T.D. Lines			All Other Lines			Total Occupancy		
	Inbound	Outbound	ACCUM	Inbound	Outbound	ACCUM	Inbound	Outbound	ACCUM	Inbound	Outbound	ACCUM
AM 630	147	145	2	17	28	-11	10	0	10	174	173	1
700	267	284	-15	26	34	-19	0	26	-16	293	344	- 50
730	401	333	53	15	34	-38	25	0	9	441	367	24
800	469	277	245	43	14	- 9	12	30	- 9	524	321	227
830	429	254	420	44	24	11	38	13	16	511	291	447
900	372	156	636	25	34	2	7	20	3	404	210	641
930	355	187	804	27	31	- 2	10	21	- 8	392	239	794
1000	453	172	1085	37	21	14	12	19	-15	502	212	1084
1030	355	197	1243	23	54	-17	17	7	- 5	395	258	1221
1100	381	247	1377	51	30	4	17	28	-16	449	305	1365
1130	267	302	1342	20	66	-42	10	7	-13	297	375	1287
NOON 1200	363	274	1431	40	24	-26	19	22	-16	422	320	1389
1230	354	314	1471	25	42	-43	10	0	- 6	389	356	1422
100	262	334	1399	28	82	-97	15	19	-10	305	435	1292
130	306	402	1303	43	20	-74	10	0	0	359	422	1229
200	436	311	1428	37	30	-67	16	16	0	489	357	1361
230	374	413	1389	12	73	-128	34	0	34	420	486	1295
300	287	370	1306	35	39	-132	28	19	43	350	428	1217
330	411	454	1263	32	58	-158	10	0	53	453	512	1158
400	410	476	1197	31	32	-159	45	18	80	486	526	1118
430	400	541	1056	36	48	-171	10	12	78	446	601	963
500	502	617	941	29	24	-166	23	15	86	554	656	861
530	364	544	761	38	80	-208	22	19	89	424	643	642
600	278	376	663	50	42	-200	9	12	86	337	430	549
630	217	238	642	56	35	-179	35	13	108	308	286	571
700	142	171	613	29	26	-176	9	24	93	180	221	530
730	174	110	677	28	30	-178	0	0	93	202	140	592
PM 800	51	113	615	33	17	-162	24	3	114	108	133	567
TOTALS	9227	8612		910	1072		477	363		10614	10047	

TABLE NO. 8

TABLE NO. 9

SUMMARY OF CAPACITIES BY LOCATION AT CORDON BOUNDARIES*

Cordon Location	Capacity in Vehicles/Hour			
	N/B	S/B	E/B	W/B
North Boundary north of 5th St. on				
Daisy Avenue	200**	600**	-	-
Magnolia Avenue	750	1120		
Chestnut Avenue	300**	300**		
Cedar Avenue	750	900		
Pacific Avenue	930	1000		
Pine Avenue	-	2000		
Locust Avenue	1720	-		
Long Beach Blvd.	990	1250		
Elm Avenue	750	900		
Linden Avenue	750	900		
Atlantic Avenue	900	1030		
Lime Avenue	300**	600**		
East Boundary east of Lime Ave. on				
5th Street			300**	860
4th Street			860	860
3rd Street			-	2060
Broadway			2040	-
1st Street			700**	860
Ocean Blvd.			2640	2140
West Boundary west of Golden Ave. on				
Ocean Blvd.			2880	3300
Ocean Blvd. Fwy. On-ramp	2000			
Broadway Off-ramp		3000		
3rd St. On-ramp	1500			

*Capacities calculated at nearest volume controlling intersection inside or outside the boundary line. Calculations based on 1965 Highway Capacity Manual Procedures Load Factor 0.9. Peak hour Factor 0.95 used.

**Stop Sign Location - Capacity dependent upon available gaps in crossing traffic stream. Estimation based on present conditions.

