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# BUNKER HILL TRANSPORTATION REPORT

DANIEL MANN, JOHNSON, & MENDERHALL

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# **BUNKER HILL TRANSPORTATION REPORT**

PREPARED FOR COMMUNITY REDEVELOPMENT AGENCY OF THE CITY OF LOS ANGELES

FEBRUARY 13, 1969 • DMJM 36909



**DANIEL, MANN, JOHNSON, & MENDENHALL**  
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PLANNING § ARCHITECTURE § ENGINEERING § SYSTEMS § ECONOMICS

11 February 1969

Mr. Richard G. Mitchell, Administrator  
Community Redevelopment Agency  
City of Los Angeles  
727 West 7th Street  
Los Angeles, California 90017

Dear Mr. Mitchell:

Transmitted herewith is our report on the transportation aspects of the Bunker Hill Urban Renewal Project. We have found that the street system proposed for Bunker Hill will be able to accommodate all anticipated traffic. The Project will require a high level of mass transit service and it is recommended that the Community Redevelopment Agency support all measures which will achieve this objective.

Our thanks to your staff, particularly Messrs. Yukio Kawaratani, Weston Bonenberger, and Lowell Patt for their assistance, and the various cooperating agencies and their personnel, most noteworthy, Messrs. Louis Clearwater of the Department of Traffic, City of Los Angeles, John Shaver and Jim Bell of the Division of Highways, and Jim Holzer and Howard Beardsley of the Southern California Rapid Transit District.

We hope this report will prove an effective aid in completing the development of the Bunker Hill Urban Renewal Project.

Very truly yours,

DANIEL, MANN, JOHNSON, & MENDENHALL

*Martin Wallen*

Martin Wallen  
Senior Transportation Engineer

MAW/mmr

## INTRODUCTION

This report presents the findings of an investigation of transportation within and to and from the Bunker Hill Urban Renewal Project.

The Project, located in the north-western sector of Downtown Los Angeles, consists of 136 acres and 26 sites of which 4 are under development and several more are in an active state of disposition. The street system and public works improvements are designed to serve very intensive urban activity comprising approximately 2,750 apartments, 9,000,000 square feet of commercial office space, 2,100 hotel and motel rooms, and 900,000 square feet of shopping facilities.

The planning phase of the project has been completed. On the westerly or lower half, construction of all public works facilities is underway or soon to be under contract, and final engineering has been started on the easterly or hill section of the project.

The purpose of the analysis was to determine whether Project streets can accommodate Project and non-Project traffic; to investigate the impact of the Project on the Downtown Los Angeles street system; and to identify any weak links: Project streets, Downtown streets, and Freeways or Freeway ramps. The elements which comprised the study were:

1. On-site parking and relationship of streets to parking facilities.
2. Traffic movement within the Project by Project and non-Project traffic.
3. Traffic on adjacent city streets
4. Traffic on adjacent freeways and freeway ramps.
5. Mass transit service.

## SUMMARY OF CONCLUSIONS

Bunker Hill redevelopment will result in more than a new skyline for Downtown Los Angeles: It means 8,000 to 10,000 automobiles per hour moving in and out of the Project area during the morning and evening peak period, an expanded transit system to serve the projected labor force of over 35,000, and, based on proposed land use, 22,600 parking spaces throughout the Project.

This investigation has found that the Bunker Hill Street System can accommodate traffic generated within the Project as well as all through traffic.

The critical link, however, in the movement of automobiles to and from Bunker Hill during the morning and evening surge of going to and from work will be the freeway system. The projected traffic load is beyond

the capability of the existing freeway system and would severely tax the ramp capacity of a future system. Even an outer freeway loop to divert through traffic, direct improvements to Downtown in the form of an Industrial Freeway, and an expanded Hollywood Freeway between Downtown and the Beverly Hills Freeway may not provide adequate Freeway service to Downtown Los Angeles.

It is probable that traffic of the magnitude generated by Bunker Hill and adjacent developments will result in a major change in the pattern of traffic flow in Downtown Los Angeles. Freeway congestion will cause more vehicles to use the local street system.

The Division of Highways and City of Los Angeles are engaged in a "Central City Freeway Study" concerned with the Downtown Area within the existing inner freeway loop and an expanded "Los Angeles Central Area Transportation Study." An objective of these studies is to determine a balance between future Downtown development and freeway and street requirements. These efforts due to begin producing usable information by late 1969 or early 1970 should verify or modify the conclusions of this analysis.

The Bunker Hill Street System is designed to accommodate extensive bus

transit. The Southern California Rapid Transit District has expressed the desire to provide bus service to the Project and agreed to a first stage shuttle service along Grand Avenue. The Project will provide a demand for very extensive surface transit capable of accommodating 8,000 to 10,000 passengers in one direction during the peak hours. This will require a major expansion and restructuring of present Downtown transit service. The feasibility of expanded bus service based on box revenues has not been determined.

#### **LAND USE AND PARKING**

The topography of the area divides the Project into a lower section west of Hope Street and a hill or upper section easterly to Hill Street. The Project and the surrounding streets are shown in Exhibit 1

The present development program calls for the lower section to be largely residential consisting of apartments, motels, and hotels, and office buildings along the southerly boundary at Fifth Street. A 42-story office building has been constructed on Parcel D and three apartment towers are under construction on Parcel E. A 2,500 auto parking structure is programmed for Parcel J-2 to serve the Atlantic-Richfield complex to the south of the Project between Flower and Figueroa Streets.

The upper section will contain high-rise office buildings and some retail shops.

The Project is to be designed so that all parking and loading goods will be on site, i. e. , off-street. The curb lane will have to accommodate the loading of transit buses in addition to moving vehicles. Consideration was given to bus turnouts but this idea was discarded due to the problem of buses reentering the traveled way, particularly during periods of peak travel.

The amount of parking to be provided for the different land uses has been the subject of extensive investigation by the CRA; various consultants to the CRA, and Departments of the City of Los Angeles. The critical issue is the parking to be associated with commercial offices which will be the dominant activity within the Project. The major variables in computing parking requirements are availability of transit, workers per unit of floor area, and car occupancy. Despite the importance of the automobile to Los Angeles, bus transit is an essential element in the accommodation of work trips to Downtown. The 1964 Barton-Aschman Study, utilizing 1958 data, estimated that 63 percent of the persons employed in the Downtown area traveled to work by transit. The Wilbur Smith 1967 parking study of the entire Central Business District reported 35 percent

used transit. It is estimated that current use of transit by office employees in the core of Downtown is approximately 45 percent.

Recent information by LARTS (Los Angeles Regional Transportation Study) shows a trend toward higher square footage per office employee. Car occupancy in Downtown Los Angeles appears to have leveled off at 1.3 persons per auto and further reduction is not anticipated.

The Los Angeles Municipal Code requirements for the core area is 1 parking space per 1,000 square feet of usable office space; however, 1 per 800 has been adopted for Bunker Hill to provide a higher level of service. Parking requirements for all land uses in the Project are shown in Table 1. For the computation of parking requirements, usable office

Table 1. Parking requirements.

Land Use	Parking
Office	1/800 square feet of usable area
Retail	4/1,000 square feet of usable area
Residential	1.35/dwelling unit
Motel	0.6/room
Hotel	0.4/room, 2/1,000 square feet of ancillary spaces

floor area is 85 percent of building area and usable retail area is 90 percent of gross building area.

Table 2 shows proposed land use by parcel and required parking spaces. The final column, actual parking spaces, shows differences from required spaces due to two conditions. In one case (Parcels F and K), sites can accommodate more parking than required for proposed land use, and additional parking is planned to accommodate anticipated demand from other sources. Adjustments are shown to seven parcels on top of the hill due to parking demand on Parcels N, S, and T exceeding site parking capability.

On Parcel F at least 1,500 (500 more than required) spaces are proposed under a retail plaza. It is possible that Parcel F will have up to 2,000 spaces (1,000 more than required), and that some or all of the excess above that allocated for retail use will be utilized by adjacent office buildings or the hotel. This could result in an a.m. inbound peak hour movement of about 500 more trips than shown on Exhibit 1 and 200 more p.m. outbound trips. The Academy for Performing Arts on Parcel K, owned by Los Angeles County, will require 300 of the 1,000 proposed parking spaces. The remainder of the parking is earmarked for

employees in the County offices to the north across First Street.

The development plan for Bunker Hill precludes parking access from Upper Grand Avenue and restricts parking to elevations below that of Upper Grand Avenue. The prohibition on the use of Upper Grand Avenue for parking access means that this street will be able to accommodate a high volume of through traffic. The restraint on parking elevation is to keep the land area at the Upper Grand Avenue level and above for pedestrian and commercial activity. The difference in elevation between Upper Grand Avenue and Lower Grand Avenue is 30 feet, permitting three levels of parking structure. An additional three levels of subsurface parking may be the maximum feasible, because with further excavation the grade approaches the Second and Third Street tunnels. An example of the problem of accommodating all parking on site is Parcel S which would require 2,000 parking spaces if developed with the 80-story, 1.9 million square foot structure. A six-level parking structure would accommodate about 1,300 spaces with consideration of building area and foundations, off-street loading and storage requirements, and vertical movement of people. The on-site parking deficiencies of Parcels N, S, and T total 1,450 spaces which were allocated to other adjacent parcels, particularly Parcels X and Y.

Table 2. Land use and parking requirements.

Parcel	Parcel Area		Land Use	Gross Floor Area <sup>1/</sup> or Units			Required Parking Spaces	Actual Parking Spaces
	Square Feet	Acres		Total	Office	Retail		
A	179,000	4.11	Residential	375 DU	-	-	450	450
B	199,000	4.57	Residential	375 DU	-	-	450	450
C	161,000	3.70	Motel	600 RMS	-	-	500	500
D	159,700	3.67	Office	700,000	700,000	-	750	950
E	594,650	13.65	Residential	1,600 DU	-	-	2,150	2,150
F	161,000	3.70	Retail	250,000	-	250,000	1,000	1,500
G	154,000	3.54	Hotel	1,500 RMS	-	-	900 <sup>2/</sup>	900 <sup>2/</sup>
H	87,000	2.00	Central Plant	65,000	-	-	10	10
I	184,000	4.22	Residential	400 DU	-	-	540	540
J1	60,000	1.37	Office	600,000	600,000	-	650	650
J2	95,000	2.18	Garage	-	-	-	2,500	2,500
K	158,000	3.63	Cultural	250,000	-	-	300	1,000
L	70,000	1.61	Office	250,000	250,000	-	270	270
M	99,000	2.27	Office	350,000	350,000	-	370	625
N	81,000	1.86	Office-Retail	1,200,000	1,175,000	25,000	1,350	950
O	73,000	1.68	Office-Retail	250,000	200,000	50,000	390	550
P	97,000	2.23	Office	500,000	500,000	-	530	530
Q	152,000	3.49	Office	750,000	750,000	-	800	800
R	63,000	1.45	Office	300,000	300,000	-	320	320
S	104,000	2.39	Office	1,900,000	1,900,000	-	2,000	1,300
T	84,000	1.93	Office-Retail	850,000	700,000	150,000	1,250	900
U	83,000	1.91	Office-Retail	300,000	175,000	125,000	630	630
V	95,000	2.18	Office	500,000	500,000	-	530	530
W	146,000	3.35	Office	550,000	550,000	-	590	590
X	195,000	4.47	Office-Retail	450,000	300,000	150,000	850	1,500
Y	192,000	4.40	Office-Retail	500,000	325,000	175,000	980	1,500
Totals	3,726,350	85.56			9,275,000	925,000	21,060	22,595

<sup>1/</sup> Square feet.

<sup>2/</sup> Estimate.

DU = Dwelling Units

RMS = Motel or Hotel Rooms



The existing fire station on Parcel X will be reconstructed on the same parcel but for the purpose of this report it is not considered a peak hour traffic generator.

### TRAFFIC GENERATION

*How many  
trips do  
offices  
generate?*

Parking spaces are the controlling factor in the magnitude of automobile traffic to and from Bunker Hill. Therefore, the 22,600 proposed parking spaces set an upper limit on traffic generated by the Project. Trips in addition to those that can be accommodated by auto must be by mass transit or taxi or foot.

The major floor space activity is office use, and the variability of work hours between various offices and buildings leads to a Downtown Los Angeles peak-hour trip-generation factor of 0.50 per office building parking space.

Retail space will generate about 1.5 outbound trips per thousand square feet of floor space. To simplify calculations where retail and office uses are proposed for the same parcel, the traffic was calculated as all office based on total parking. This yields higher traffic flow because the retail generation is negligible in the morning and approximately equivalent dur-

ing the evening peak, based on 0.5 inbound and 1.5 outbound per 1,000 square feet of floor area.

Traffic generation factors are shown in Table 3, and peak hour traffic generated by the various parcels within the Project in Table 4. The maximum movements are 8,300 trips inbound and 9,100 outbound during the evening peak hour. The morning inbound movement is inflated by 1,350 trips which represent the 2,700 parking spaces allocated to the 675,000 square feet of retail use on top of the hill. This increment can be considered as a contingency factor in case the floor space is used for office rather than retail as proposed.

Table 3. Traffic generation factors.

Land Use	Unit Used for Factor	Trips			
		a. m.		p. m.	
		In	Out	In	Out
Office	Parking Space	0.5	-	-	0.5
Retail in Office	Parking Space	0.5	-	0.1	0.1
Retail Only	1,000 sq. ft. of Floor Area	-	-	0.5	1.5
Residential	Dwelling Unit	0.1	0.4	0.4	0.2
Hotel	Guest Room	-	0.1	0.1	0.1
Motel	Guest Room	-	0.2	0.2	-

Table 4. Bunker Hill peak-hour traffic generation.

Parcel	Parking Spaces	Units	Morning					Evening				
			In			Out		In		Out		
			Factor Per Unit	Trips	Percent of Total Entering	Factor Per Unit	Trips	Factor Per Unit	Trips	Factor Per Unit	Trips	Percent of Total Leaving
A	450	DU (375) <sup>1/</sup>	0.1	40	0.5	0.4	150	0.4	150	0.2	75	1.0
B	450	DU (375)	0.1	40	0.5	0.4	150	0.4	150	0.2	75	1.0
C	500	RMS (600) <sup>2/</sup>	-	Nom.	-	0.2	120	0.2	120	-	Nom.	-
D	950	Parking	0.5	475	6.0	-	-	-	Nom.	0.5	475	5.0
E	2,150	DU (1,600)	0.1	160	2.0	0.4	640	0.4	640	0.2	320	4.0
F	1,500	1,000 Sq. Ft. (250)	-	Nom.	-	-	-	0.5	125	1.5	375	4.0
G	900	RMS (1,500)	-	Nom.	-	0.1	150	0.1	150	0.1	150	2.0
H	10	-	-	-	-	-	-	-	-	-	-	-
I	540	DU (400)	0.1	40	0.5	0.4	160	0.4	160	0.2	80	1.0
J1	650	Parking	0.5	325	4.0	-	-	-	-	0.5	325	4.0
J2	2,500	Parking	0.5	1,250	14.5	-	-	-	-	0.5	1,250	14.0
K	1,000	Parking	0.5	500	6.0	-	-	-	-	0.5	500	5.0
L	270	Parking	0.5	135	2.0	-	-	-	-	0.5	135	1.0
M	625	Parking	0.5	310	4.0	-	-	-	-	0.5	310	3.0
N	950	Parking	0.5	475	6.0	-	-	-	-	0.5	475	5.0
O	550	Parking	0.5	275	3.0	-	-	-	-	0.5	275	3.0
P	530	Parking	0.5	265	3.0	-	-	-	-	0.5	265	3.0
Q	800	Parking	0.5	400	5.0	-	-	-	-	0.5	400	4.0
R	320	Parking	0.5	160	2.0	-	-	-	-	0.5	160	2.0
S	1,300	Parking	0.5	650	8.0	-	-	-	-	0.5	650	7.0
T	900	Parking	0.5	450	6.0	-	-	-	-	0.5	450	5.0
U	630	Parking	0.5	315	4.0	-	-	-	-	0.5	315	4.0
V	530	Parking	0.5	265	3.0	-	-	-	-	0.5	265	3.0
W	590	Parking	0.5	295	4.0	-	-	-	-	0.5	295	3.0
X	1,500	Parking	0.5	750	8.0	-	-	-	-	0.5	750	8.0
Y	1,500	Parking	0.5	750	8.0	-	-	-	-	0.5	750	8.0
Totals	22,595			8,325	100.0		1,370		1,495		9,120	100.0

<sup>1/</sup> DU = Dwelling Units

<sup>2/</sup> RMS = Motel or Hotel Rooms

## **STREET SYSTEM**

The development plan for Bunker Hill will result in very substantial changes to the street system of that area. The east-west streets on top of the hill are to be improved from 2 lanes to 4 lanes plus left turn pockets, and two new streets, Second Place and Third Place are to be created.

The north-south improvements are of greatest significance in that they will be directly beneficial to through movement in addition to the provision of service to the Project. Flower Street, which used to terminate at First Street, is entirely reconstructed from a 4-lane 56-foot roadway to a 6-lane divided 80-foot roadway. North of Third Street it swings east to a junction with Hope Street to provide a direct connection to the Hollywood Freeway. Grand Avenue is the major street in the Project. Between Fourth Street and Second Place, a distance of 3 blocks through the area to be most intensely developed, the street is to be separated into 2 levels approximately 30 feet apart. The lower level which provides access to parking facilities is to consist of 4 lanes and a left turn pocket. The upper level which will replace the existing street is to contain 6 lanes plus left turn pockets. In addition to traffic service, the median will be open to provide light and ventilation to the

lower level. Upper Grand Avenue as the major street in the Project will be the backbone of future bus service through the Project. An upper level loop off Grand Avenue over Olive Street, Second Place, and the Third Street Tunnel will provide drop off and pick-up service to adjacent parcels but is not to be used for access to parking facilities. The south-east corner of Third Street and Upper Olive Street will be the Bunker Hill terminus of the Angel's Flight cable car which is to be reconstructed in order to continue to provide transportation to and from Hill Street, the eastern boundary of the Project. Hill Street within the Project area will be widened from a 56 to 66-foot roadway with all of the work to be performed on the west side within the Project so as to avoid infringement on the existing development to the east.

The street system under construction is shown in Exhibits 2A and 2B which include the traffic striping delineating the number of lanes.

## **TRAFFIC ASSIGNMENT AND STREET CAPABILITY**

The key factors in assignment of traffic to the Bunker Hill street system are direction of approach and whether by freeway or local street. The choice between freeway or local street is dependent on the ability of the freeway to accept the traffic and the Downtown ramps to interface with local streets.

The first approach in this analysis was to assume that additional future traffic approaching Downtown Los Angeles could do so in accordance with demand based on established patterns of residential development. This resulted in a pattern as shown in Exhibit 3:

From the North 21%  
From the East 22%  
From the South 17%  
From the West 40%

These figures reflect the Los Angeles Department of Traffic annual cordon counts of Downtown Los Angeles, the 1965 postcard questionnaire of Los Angeles County employees, the Barton-Aschman Bunker Hill Study of 1964, and a slight weighting to give consideration to possible higher employment rates from population areas to the east and south.

The distribution between freeway and local street was taken as 65 percent freeway and 35 percent local street. The 65 percent freeway includes the Industrial Freeway but not that portion of the Pasadena and Golden State Freeway which would use Hill Street and other north-south streets to reach the Project. The auto trip movement utilizing

the freeway system could exceed 70 percent of the total auto movement to and from Bunker Hill.

Exhibit 4, Metropolitan Freeway System shows the existing freeways in the Los Angeles Region and those proposed for future construction. The intent of this exhibit is to illustrate the fact that future freeway construction could have a major impact on Downtown Los Angeles both through new construction directly to Downtown (such as the Industrial Freeway) and relief to Downtown freeways through bypass facilities for through traffic. Studies by LARTS indicate that freeways comprising the Inner Loop around Downtown carry about 40 percent through traffic and 60 percent to and from Downtown. An Outer Freeway Loop as shown in Exhibit 4 is under study with some thought indicating that early construction of the Western Freeway west of and parallel to the Harbor Freeway coupled with the planned Slausen Freeway could provide a major diversion of through traffic from the Inner Freeway Loop and thereby provide a substantially increased capacity for traffic to Downtown.

The programming of future freeway and major street construction will be influenced by two studies currently under way. The first is the

"Central City Freeway Study" administered by LARTS in cooperation with the City of Los Angeles which is furnishing the land use inputs. This effort is scheduled to have preliminary results available by the end of 1969 and be completed in 1970. The study area is within the Inner Freeway Loop.

A study which is just getting under way and may have dramatic impact is the "Los Angeles Central Area Transportation Study" covering that portion of Los Angeles from Beverly Hills easterly to the county line and from the Hollywood Hills to Century Blvd. The aforementioned "Central City Freeway Study" will be an input to the second expanded effort which in the next 2 to 4-year period should provide better information as to the future capability of the freeway system to deliver traffic to Downtown Los Angeles.

The first test of Bunker Hill traffic was the a. m. peak hour movement. The assumption was made that future freeway construction would provide adequate freeway lane capacity to accommodate Bunker Hill traffic and that the locations to be tested were the local streets and freeway ramps.

Exhibit 5 shows the loading of Project traffic to the Project street system. The assignment procedure was based on the shortest route

to each parcel from the freeways and surface streets in accordance with the direction of approach as shown in Exhibit 4. Parking structure driveways for along Lower Grand Avenue and elsewhere in the Project are assumed as 2 lanes in and 2 lanes out. The traffic volumes generated by the parking facilities are well within garage capability based on car identification control of between 600 to 800 per lane entering and 300 to 500 exiting depending on traffic congestion.

Actual traffic paths will be an adjustment to many considerations and probably substantially different than as shown in Exhibit 5. However, the density of Project traffic should be similar to that shown if the freeway and adjacent street capability approaches that assumed.

Several Project traffic characteristics are discernable in Exhibit 5. The southbound movement along Hope Street is in high demand (1,018) by Parcels O and U and others north of Fourth Street thereby limiting access to the garage at Parcel J from this route. Alternative routes to Parcel J are via Fourth Street from the west or Sixth Street and then north on Flower Street. Parcels X and Y between Hill and Olive Streets are assumed to be traffic oriented toward Olive Street with only right turn movements from Hill Street, a major transit route and important

north-south through street with direct access to the Pasadena and Golden State Freeways.

Exhibit 6, which is based on Tables 5 and 6, combines Project and non-Project traffic at the Project boundary and the adjacent freeway ramps. The ability of the freeway system to deliver this traffic to Downtown Los Angeles is based on the assumptions that there will be (1) substantial diversion of existing north-south traffic to the Industrial Freeway, (2) a major expansion of the Hollywood-Santa Ana corridor, and (3) a diversion of existing through traffic on these routes to the Outer Freeway Loop. It is these assumptions that are to be tested in the "Central City Freeway Study" and "Los Angeles Central Area Transportation Study."

Bunker Hill is at present largely vacant land and used for employee parking. The development of this property will displace present parkers who will either park elsewhere or become employees in the Bunker Hill area due to business activity relocating from elsewhere in Downtown Los Angeles. In order to avoid double counting traffic in the Project Area, that to be generated and that which will be displaced, Table 5 makes an allowance for the removal of 5,000 vehicles from the Project Area.

The analysis of Project and other traffic at the Project boundary as shown in Table 5 and at the critical freeway ramps in Table 6 contains no expansion of traffic other than that generated by Bunker Hill. This assumption should be valid at the Project boundary, as shown in Table 5, due to the dislocation of the present parking within the Project. This assumption will also apply to freeway ramps, as shown in Table 6, if the total growth in Downtown Los Angeles is no greater than that amount projected for Bunker Hill. This approach results in Table 6 presenting an optimistic projection of future conditions.

The validity of the assumptions which form the basis for analyzing inbound traffic are subject to question as is any assumption on the future of Downtown Los Angeles. The value of the analysis presented herein is that the Downtown system of streets and freeways is evaluated under a constant set of conditions and the relative deficiencies can be noted and possible street improvements investigated as shown in Tables 5 through 9.

Street capacity was derived from a basic value of 600 vehicles per lane per hour for level of service "D" and modified according to conditions at each intersection.

Table 5. Volume/capacity computations for a.m. entering traffic at Project boundary.

Approach Street	Location	Current A.M. Peak Hour	Project Traffic	Sum of Current Plus Project	Sum x 0.796 <sup>1/</sup>	Estimated <sup>2/</sup> 1985 A.M. Peak Hour Demand	Number of Lanes	Estimated Capacity	Volume/Capacity Ratio
Figueroa Street	N/O First Street	1,216	41	1,257	1,000	1,300	3	1,500	0.87
Hope Street	N/O First Street	540	1,386	1,926	1,528	1,550	2 + L	1,300	1.19
Grand Avenue	N/O First Street	1,076	900	1,976	1,568	1,600	3 + L <sup>3/</sup>	1,950	0.82
Hill Street	N/O First Street	1,100	348	1,448	1,148	1,300	3	1,300	1.00
			2,675		5,244	5,750			
First Street	E/O Hill Street	1,212	147	1,359	1,078	1,300	3	1,300	1.00
Second Street	E/O Hill Street	200	250	450	357	400	2 -	800	0.50
Third Street	E/O Hill Street	994	201	1,195	948	1,000	4	900	1.11
Fifth Street	E/O Hill Street	950	267	1,217	965	1,000	4	1,500	0.67
			865		3,348	3,700			
Hill Street	S/O Fifth Street	567	Nom.	567	450	600	3	710	0.85
Olive Street	S/O Fifth Street	350	400	750	595	600	3 -	1,000	0.60
Grand Avenue	S/O Fifth Street	682	389	1,071	851	900	2 +	850	1.06
Flower Street	S/O Fifth Street	443	464	907	720	800	2 +	900	0.89
Figueroa Street	S/O Fifth Street	575	180	755	598	700	2 + L	1,300	0.54
			1,433		3,214	3,600			
Lower Fourth Street	W/O Figueroa Street	474	218	692	549	600	2	1,000	0.60
Upper Fourth Street	W/O Figueroa Street	3,000	1,937	4,937	3,900	3,900	4	4,600	0.85
Third Street Ramp	W/O Figueroa Street	0	547	547	435	550	2	500	1.10
Second Street	W/O Figueroa Street	1,181	280	1,461	1,160	1,200	2 + L	1,300	0.92
First Street	W/O Figueroa Street	1,238	370	1,608	1,273	1,300	2 <sup>4/</sup>	1,300	1.00
		15,798	3,352		7,317	7,550			
Total A.M. Peak Hour Traffic Generated by Project			=	8,325					
Total A.M. Peak Hour Traffic Generated by Project + Existing				=	24,123				
Less Parking Spaces Presently Occupied + Diverted Traffic (Est.)				=	-5,000				
Conservative Estimate of Future A.M. Peak Hour Demand				=	19,123	← check →	19,123	more conservative →	20,600

<sup>1/</sup> 19,123 ÷ 24,123 = 0.796.

<sup>2/</sup> Either existing peak hour or sum of existing and Project x 0.796; whichever is larger.

<sup>3/</sup> 2 + L north of Temple Street.

<sup>4/</sup> 3 + L west of Grand Avenue.

Exhibit 6 displays the volume/capacity ratios at the perimeter of the Project for inbound morning traffic and the ramp loadings of Table 6. It should be noted that the situation is not critical, and at Hope and Fifth Streets some surplus capacity may be available. The volume/capacity ratios at the freeway corridor as shown in Table 6 present a more serious picture. Even with assumed street improvement to facilitate ramp discharge the situation is more congested than at the Project perimeter. If the reduction of existing Project trips at the

freeway ramps is discounted on the assumption that these will be displaced rather than absorbed by the Project, then the volume/capacity ratios in Table 6 would increase though conditions may remain as shown at the Project perimeter. Several conclusions are suggested by this analysis. The most significant is that the freeway ramps are the most critical element in the highway system serving Bunker Hill. If the construction of additional freeways were to provide unlimited freeway capability, the ramps would

Table 6. Volume/capacity computations for a.m. entering traffic at other critical locations.

Street	Location	Current A.M. Peak Hour	Project Traffic	Sum of Current Plus Project	Sum x 0.796	Estimated 1985 A.M. Peak Hour Demand	Number of Lanes	Estimated Capacity	Volume/Capacity Ratio
Hollywood Freeway Ramp	At Grand Avenue	600	822	1,422	1,133	1,200	2	1,000 <sup>1/</sup>	1.20
Hollywood Freeway Ramp	At Hope Street	600	608	1,208	960	1,000	2	800	1.20
Hollywood Freeway Ramp	West of Hope Street	600	651	1,251	496	1,000	2	900	1.11
Grand Avenue	At Temple Street	1,316	822	2,138	1,705	1,800	2 + L	1,250	1.44 <sup>2/</sup>
Hill Street	At Temple Street	1,539	348	1,887	1,502	1,600	2 +	1,350	1.18
Harbor Freeway Ramp	NB at Fourth Street	1,250	1,142	2,392	1,908	1,950	1	1,000	1.45 <sup>3/</sup>
Sixth Street + Freeway	At Figueroa Street	2,123	448	2,571	2,047	2,400	4	2,400	1.00 <sup>4/</sup>

<sup>1/</sup> Assumes widening of Grand Avenue on west side to provide additional lane to Temple Street.

<sup>2/</sup> If widening on west side for additional lane to Temple Street then capacity = 1,900 and volume/capacity = 1.06.

<sup>3/</sup> If widening of off-ramp to 2 lanes then feasible capacity = 1,800 and volume/capacity = 1.08.

<sup>4/</sup> If widening on north side to 5 lanes to Flower Street then capacity = 3,000 and volume/capacity = 0.80.



be able to discharge less than total demand and surface street capability. The Bunker Hill street system can accommodate all traffic entering the Project Area. The internal street system very effectively distributes local traffic to different parking facilities and through the two-level system of Grand Avenue, and the high capacity of other streets provides for passage of through traffic.

An inspection of outbound p.m. peak-hour ramp volumes disclosed that if the freeway could accept all that the ramps could deliver, much additional traffic could be accommodated. Though significant, this was substantially less than the freeway demand of 65 percent of the Project traffic as distributed in accordance with Exhibit 3.

In an effort to determine maximum outbound capability a test was made altering distribution to reflect available street capacity. This meant a substantial change in southbound movement from the Harbor Freeway to surface streets and other modifications as shown in Table 7.

The heavy eastbound surface movement includes a diversion of Harbor Freeway trips to the Industrial Freeway. The high diversion of southbound Harbor Freeway trips to surface streets is valid if the longer trips can enter the freeway south of the Santa Monica Freeway. This

condition may not be possible because the Division of Highways is testing a ramp metering system on the Harbor Freeway south of the Santa Monica in order to improve ramp capacity in the Downtown area. Under these conditions trips would be made on surface streets for long distances rather than to freeway ramps in the direction of travel.

The possible extension of Hope Street across Fifth appears to offer substantial traffic benefit to the Project Area, particularly access to the parking concentration on parcels J-1 and J-2. Hope street south

Table 7. Alternative distribution of Project traffic.

Direction	a. m. - In (Percent)	Modified p. m. - Out (Percent)
Hollywood and Pasadena Freeways	26.0	26.0
Surface - West	8.5	13.2
Harbor Freeway South	26.0	9.8
Surface - South	12.0	20.8
Surface - East	10.4	15.4
Freeway - East	10.0	10.0
Surface - North	7.1	4.8
	48.4	46.0

of the Project is currently lightly traveled carrying less than 6,000 vehicles per day and recording a southbound peak movement in 1967 of 300 vehicles per hour, even less than the northbound of 360. In view of the fact that freeway access is such an important element of Bunker Hill mobility, the full value of a Hope Street connection is dependent on the ability of traffic which would travel south on this route to eventually gain freeway access.

The assignment of outbound Project traffic to perimeter streets and freeway ramps and volume/capacity ratios for the perimeter streets are shown in Exhibit 7 and Tables 8 and 9. As in the inbound analysis an allowance was made for the elimination of trips by vehicles presently parking in the Project Area. The previous comments concerning this approach are equally applicable to the p. m. analysis.

Viewing the volume/capacity ratios under the optimistic conditions presented in Exhibit 7, which assumes no freeway restraint and maximum ramp capacity, it is noted that the critical sector is the freeway ramps. The perimeter streets can give a reasonable level of service with eastbound movement permitted on Fourth Street from Lower Grand Avenue. The Project streets, having greater capacity than any adjoining

streets and an excellent relationship to parking facilities, are in a position to accommodate all traffic that can be delivered to the area.

#### **MASS TRANSIT**

Present mass transit service to Bunker Hill is best noted by its absence. This is due to the fact that, in the past, Bunker Hill was a medium density residential area with street grades best suited for cable car service. The Angel's Flight cable car between Hill and Olive Streets covering a vertical rise of 95 feet should be reconstructed as an integral part of any future Bunker Hill Transportation System.

Exhibit 8 shows that except for Bunker Hill, Downtown Los Angeles has fairly good bus service consisting of local and suburban lines including utilization of existing freeways. The Southern California Rapid Transit District (SCRTD) furnishes almost exclusive service to Downtown Los Angeles with good coverage to the west, north, and east. Much of the southerly and southwestern areas of Los Angeles are served by small local transit operations not capable of providing the level of service to Downtown that can be furnished by SCRTD.

At the present time, SCRTD can put about 1300 buses on the street during peak periods. According to the 1967 Cordon Count by the Los

Table 8. Volume/capacity computations for p.m. leaving traffic at Project boundary.

Street	Location	Current P.M. Peak Hour	Project Traffic	Sum of Current Plus Project	Sum x 0.82 <sup>1/</sup>	Estimated <sup>2/</sup> 1985 P.M. Peak Hour Demand	Number of Lanes	Estimated Capacity	Volume/Capacity Ratio
Figueroa Street	N/O First Street	1,600	200	1,800	1,473	1,650	3	1,500	1.10
Hope Street	N/O First Street	523	520	1,043	853	900	2	1,300	0.69
Grand Avenue	N/O First Street	1,278	920	2,198	1,800	1,800	3	1,300 <sup>3/</sup>	1.39
Hill Street	N/O First Street	1,232	200	1,432	1,173	1,250	3	1,300	0.96
			1,840		5,299	5,600			
First Street	E/O Hill Street	1,500	400	1,900	1,555	1,600	3	1,625	0.98
Second Street	E/O Hill Street	244	600	844	691	700	2 -	800	0.88
Fourth Street	E/O Hill Street	1,250	1,000	2,250	1,841	1,850	4	1,950	0.95
			2,000		4,097	4,150			
Hill Street	S/O Fifth Street	566	200	766	626	650	3	710	0.92
Olive Street	S/O Fifth Street	678	300	978	800	800	3 -	1,000	0.80
Grand Avenue	S/O Fifth Street	776	400	1,176	959	1,000	2 +	1,000	1.00
Flower Street	S/O Fifth Street	586	500	1,086	888	900	2 +	900	1.00
Figueroa Street	S/O Fifth Street	650	500	1,150	940	950	2	1,000	0.95
			1,900		4,213	4,300			
Fifth Street	W/O Figueroa Street	2,900	1,200	4,100	3,356	3,400	5 +	3,650	0.93
Third Street	W/O Figueroa Street	2,400	1,580	3,980	3,260	3,300	4 +	3,650	0.90
Second Street	W/O Figueroa Street	870	500	1,370	1,122	1,150	2 +	1,300	0.89
First Street	W/O Figueroa Street	1,364	100	1,464	1,200	1,400	2	1,300	1.08
		18,417	3,380		8,938	9,250			

Total P.M. Peak Hour Traffic Generated by Project = 9,120

Total P.M. Peak Hour Traffic Generated by Project + Existing = 27,537

Less Parking Spaces Presently Occupied + Diverted Traffic (Est.) = -5,000

Conservative Estimate of Future P.M. Peak Hour Demand = 22,537 ← check → 22,537 <sup>more</sup> → 23,300 <sub>conservative</sub>

<sup>1/</sup> 22,537 ÷ 27,537 = 0.82.

<sup>2/</sup> Either existing peak hour or sum of existing and Project x 0.82; whichever is larger.

<sup>3/</sup> 2 Lanes with lesser capacity north of Temple Street. Low capacity because of Civic Center garages.

Table 9. Volume/capacity computations for p.m. leaving traffic at other critical locations.

Street	Location	Current P.M. Peak Hour	Project Traffic	Sum of Current Plus Project	Sum x $0.82^{\underline{1/}}$	Estimated 1985 P.M. Peak Hour Demand	Number of Lanes	Estimated <sup>2/</sup> Capacity	Volume/Capacity Ratio
Grand Avenue	S/O Temple Street	1,393	920	2,313	1,895	1,900	3 + L	1,800 <sup>3/</sup>	1.06
Grand Avenue	N/O Temple Street	1,870	800	2,670	2,190	2,200	2	1,300	1.69 <sup>5/</sup>
Hollywood Freeway Ramp	At Grand Avenue WB	1,400	800	2,200	1,805	1,850	3	1,400	1.32
Hollywood Freeway Ramp	At Hope Street EB	1,000	600	1,600	1,312	1,350	2	2,000 <sup>4/</sup>	0.68
Hill Street	N/O Temple Street	1,293	200	1,493	1,225	1,350	2 +	1,300	1.04
Broadway Street	N/O Temple Street	1,154	600	1,754	1,440	1,450	2 +	1,300	1.12
Third Street	W/O Harbor Freeway	1,540	200	1,740	1,428	1,600	3 +	1,600	1.00
Fifth Street	W/O Harbor Freeway	1,200	400	1,600	1,312	1,350	3 +	1,600	0.85
Harbor Freeway Ramp	NB at Third Street	550	800	1,350	1,107	1,150	1	1,000	1.15
Harbor Freeway Ramp	SB at Third Street	760	500	1,260	1,033	1,100	1	1,000	1.10
Harbor Freeway Ramp	NB at Fifth Street	850	400	1,250	1,025	1,100	1	1,000	1.10
Harbor Freeway Ramp	SB at Fifth Street	840	400	1,240	1,017	1,100	1	1,000	1.10
Hollywood Freeway Ramp	WB at Broadway	700	600	1,300	1,066	1,100	1	1,000	1.10
Fourth Street	E/O Los Angeles Street	1,246	800	2,046	1,675	1,700	4	2,400	0.71

<sup>1/</sup> 0.82 from Table 7.

<sup>2/</sup> Assuming freeway can accept volumes delivered by ramp.

<sup>3/</sup> Assuming widened roadway north of Temple Street, see footnote <sup>5/</sup>.

<sup>4/</sup> Assuming modification at throat of ramp.

<sup>5/</sup> If widening on east side for additional lane north of Temple Street then capacity = 1,950 and volume/capacity = 1.13.

Angeles Department of Traffic, buses carried a load of about 30,000 people in and out during the morning and evening peak periods. Total one-way bus movement is about 125,000 people per day into and out of Downtown Los Angeles.

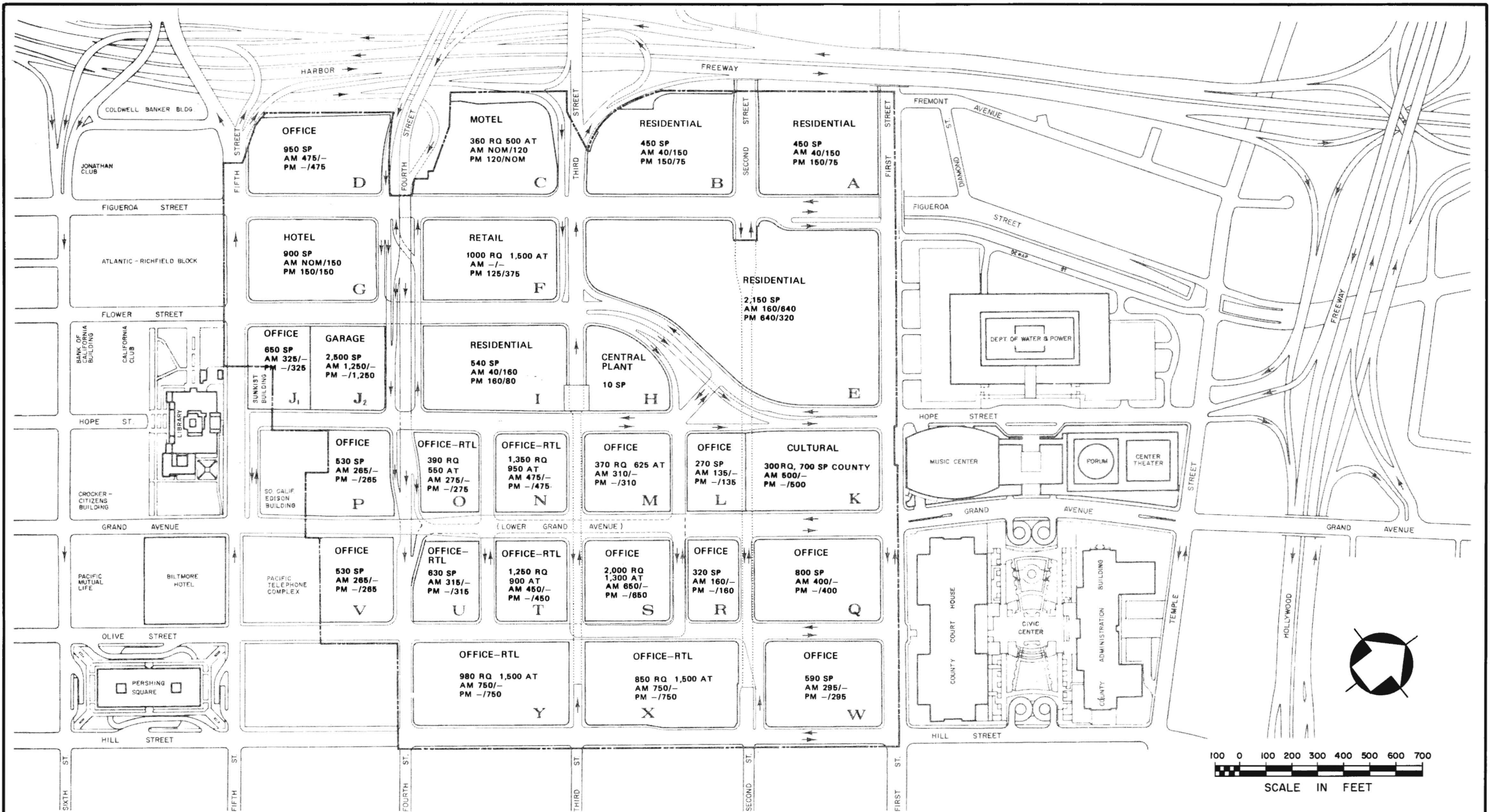
*we are taking  
in terms of  
80,000*

Bunker hill, with its potential labor force of between 25,000 and 35,000 or more employees, provides an ideal transit market. A total of 8,000 one-way peak-hour trips would be only one third of the labor force and the lowest value of the present split between auto and bus modes to Downtown Los Angeles. A movement of this magnitude would represent about 200 or more bus trips and require a substantial expansion in the number of buses in peak hour operation.

Bunker Hill is being designed to accommodate immediate bus service and subsurface transit if such should be constructed in Los Angeles. Street grades and other geometrics have been prepared with bus transit as a design factor. SCRTD has agreed to provide a shuttle service through Bunker Hill along Grand Avenue in conjunction with the inauguration of the development on top of the hill, and has indicated a desire to expand service in accordance with its capability.

To provide the Bunker Hill area with a level of service compatible with

development will require a major expansion of present SCRTD service to Downtown Los Angeles. Exhibit 9 shows a possible bus network covering the Project which would entail a major change in routing of much of the bus service in Downtown Los Angeles. The operational changes of routes and schedules pose no problem, but the feasibility of expanded bus service based on fare-box revenues has not been determined.



OFFICE  
950 SP  
AM 475/-  
PM -/475

MOTEL  
360 RQ 500 AT  
AM NOM/120  
PM 120/NOM

RESIDENTIAL  
450 SP  
AM 40/150  
PM 150/75

RESIDENTIAL  
450 SP  
AM 40/150  
PM 150/75

HOTEL  
900 SP  
AM NOM/150  
PM 150/150

RETAIL  
1000 RQ 1,500 AT  
AM -/-  
PM 125/375

RESIDENTIAL  
2,150 SP  
AM 160/640  
PM 640/320

OFFICE  
650 SP  
AM 325/-  
PM -/325

GARAGE  
2,500 SP  
AM 1,250/-  
PM -/1,250

RESIDENTIAL  
540 SP  
AM 40/160  
PM 160/80

CENTRAL PLANT  
10 SP

OFFICE  
530 SP  
AM 265/-  
PM -/265

OFFICE-RTL  
390 RQ  
550 AT  
AM 275/-  
PM -/275

OFFICE-RTL  
1,350 RQ  
950 AT  
AM 475/-  
PM -/475

OFFICE  
370 RQ 625 AT  
AM 310/-  
PM -/310

OFFICE  
270 SP  
AM 135/-  
PM -/135

CULTURAL  
300 RQ, 700 SP COUNTY  
AM 500/-  
PM -/500

OFFICE  
530 SP  
AM 265/-  
PM -/265

OFFICE-RTL  
630 SP  
AM 315/-  
PM -/315

OFFICE-RTL  
1,250 RQ  
900 AT  
AM 450/-  
PM -/450

OFFICE  
2,000 RQ  
1,300 AT  
AM 650/-  
PM -/650

OFFICE  
320 SP  
AM 160/-  
PM -/160

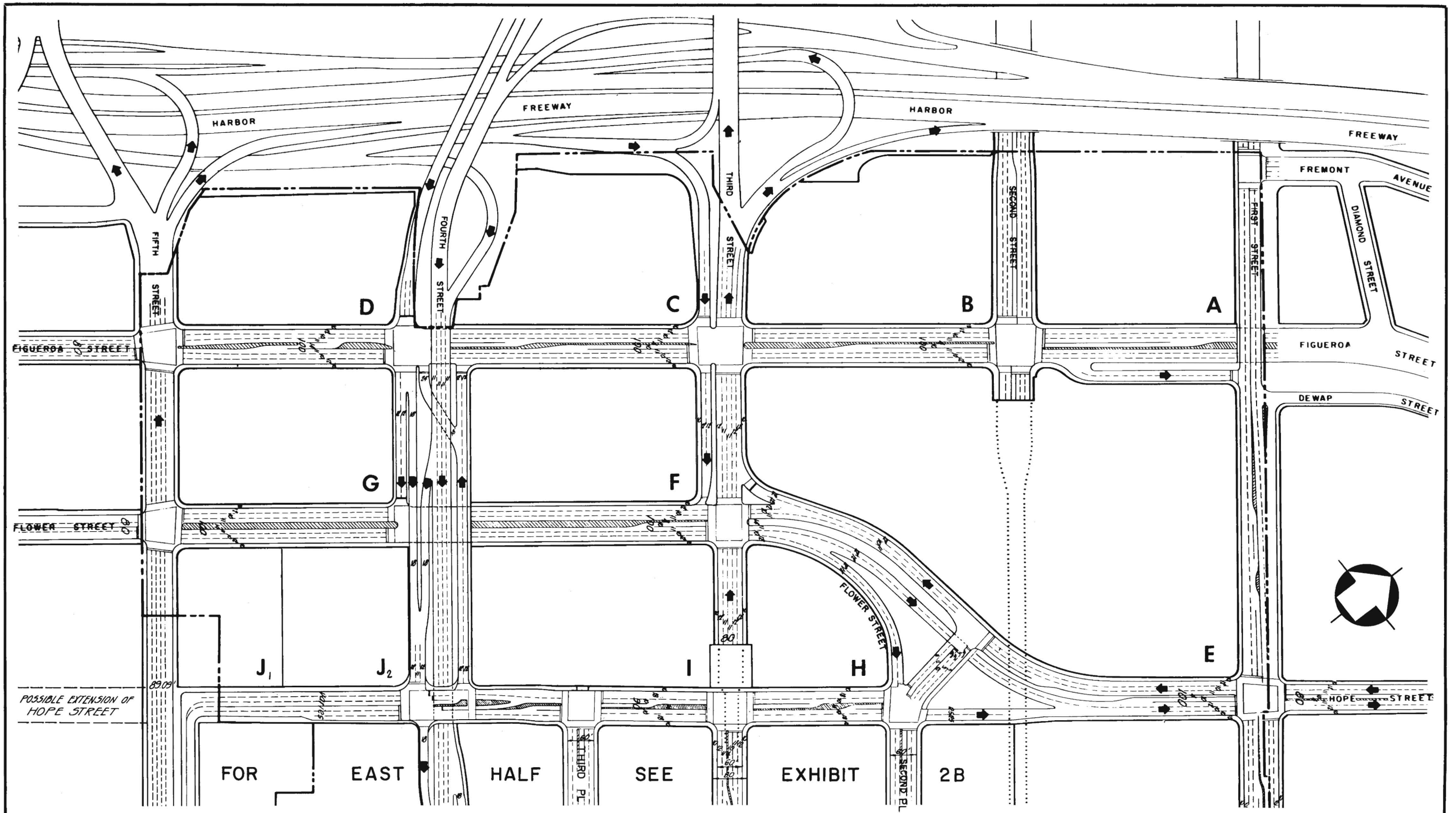
OFFICE  
800 SP  
AM 400/-  
PM -/400

OFFICE-RTL  
980 RQ 1,500 AT  
AM 750/-  
PM -/750

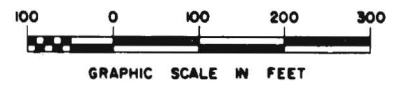
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AM 750/-  
PM -/750

OFFICE  
590 SP  
AM 295/-  
PM -/295





POSSIBLE EXTENSION OF HOPE STREET



**LEGEND**

Indicates Pointed Traffic Island

**BUNKER HILL TRANSPORTATION REPORT**

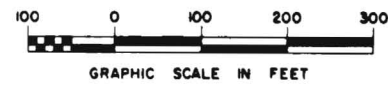
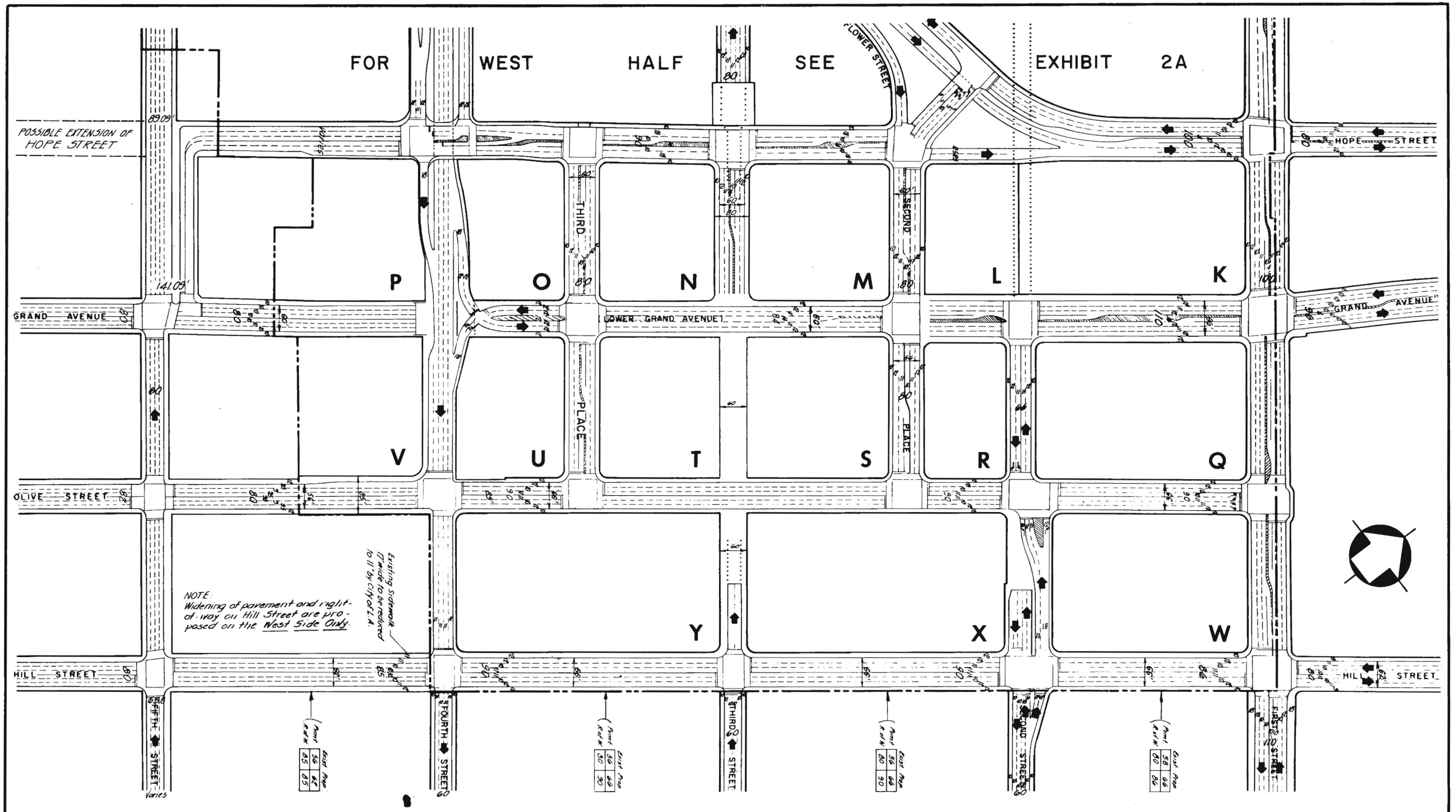
**DMJM**  
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 PLANNING & ARCHITECTURE & ENGINEERING & SYSTEMS & ECONOMICS

**TRAFFIC STRIPING  
 WEST HALF**

EXHIBIT **2A**







**LEGEND**

Indicates Pointed Traffic Island

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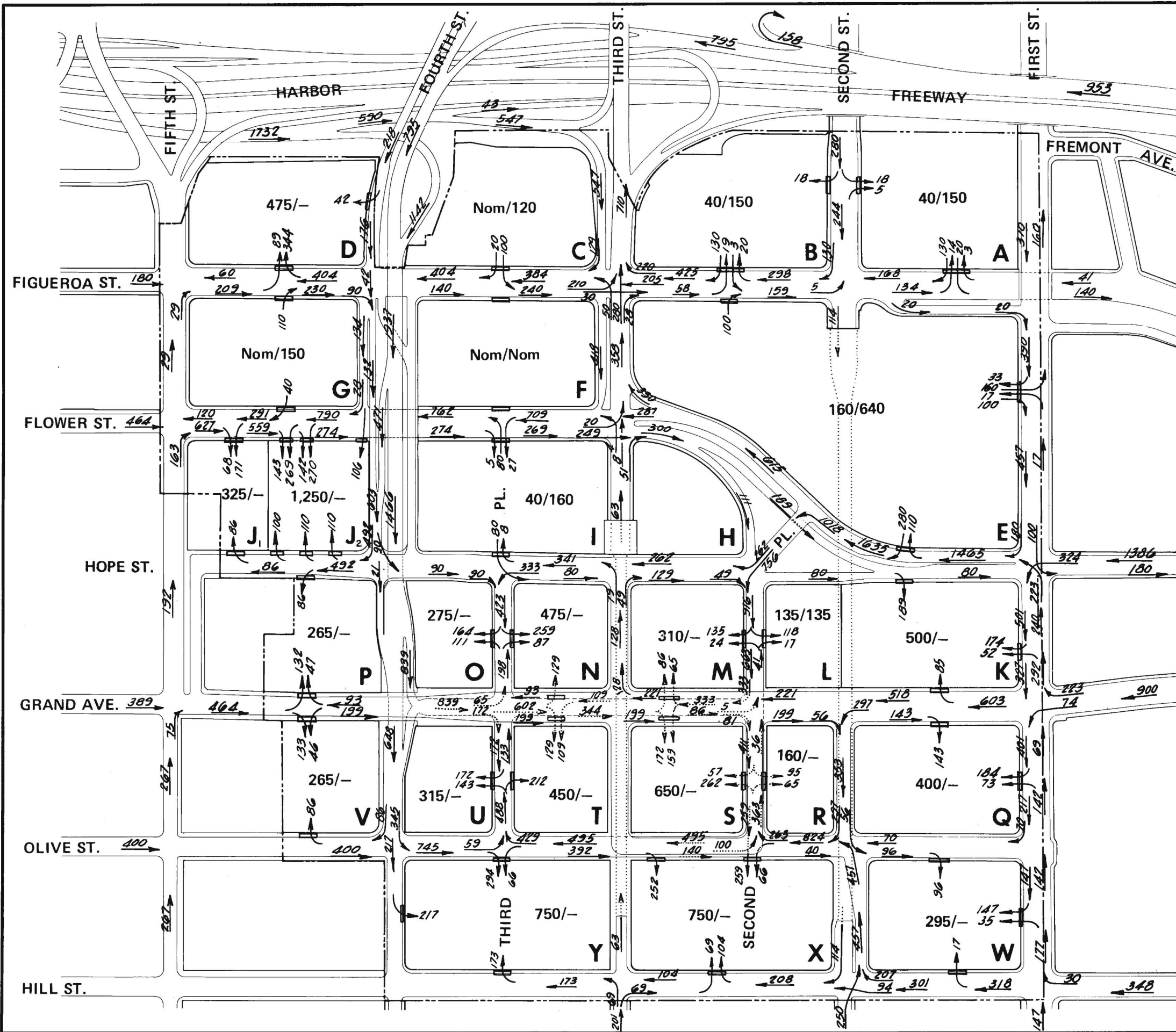


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**TRAFFIC STRIPING  
EAST HALF**





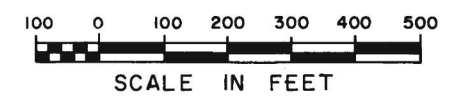


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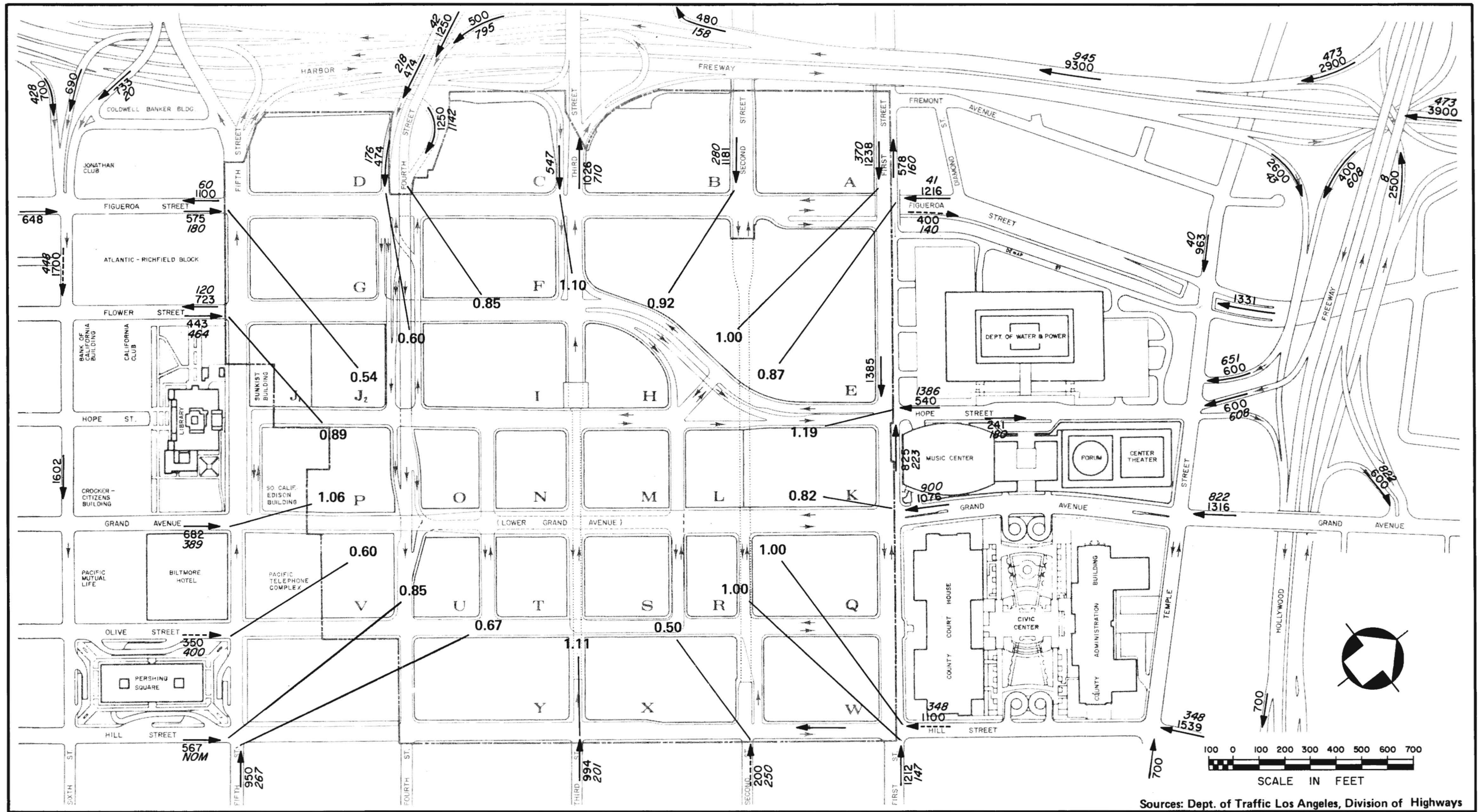
Nom = NOMINAL

IN/OUT

... = LOWER LEVEL



**AM PEAK HOUR  
PROJECT TRAFFIC**



Sources: Dept. of Traffic Los Angeles, Division of Highways

**LEGEND**

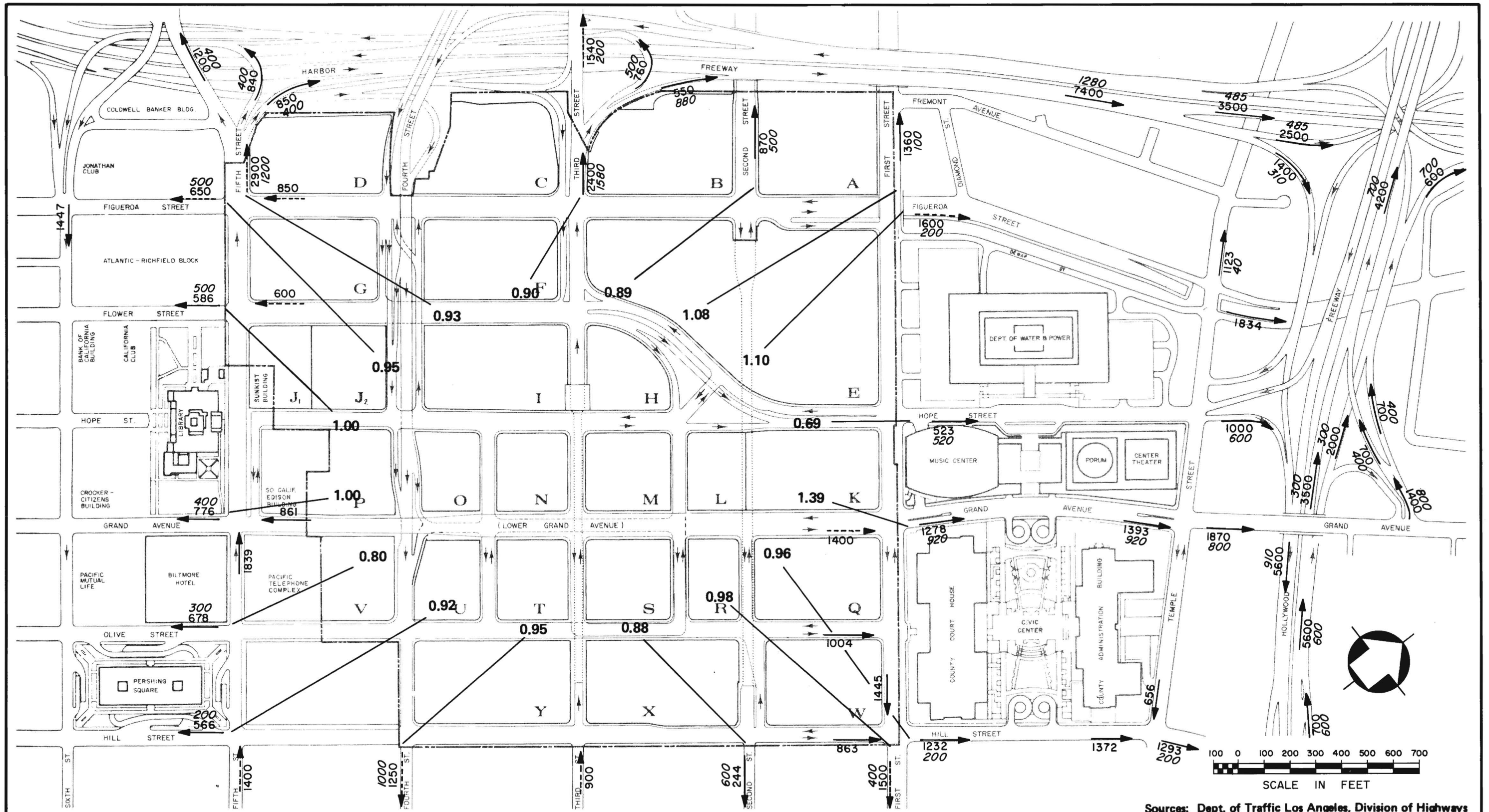
- ← 100 TRAFFIC - 1966-1967 ACTUAL
- ← 100 TRAFFIC - 1967 ESTIMATED
- ← 100 TRAFFIC - PROJECT GENERATED
- 1.00 FUTURE VOLUME/CAPACITY RATIO (BUSES EXCLUDED)

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


**INBOUND AM  
 PEAK HOUR TRAFFIC  
 FREEWAY RAMPS AND  
 PROJECT PERIMETER**

EXHIBIT **6**



Sources: Dept. of Traffic Los Angeles, Division of Highways

**LEGEND**

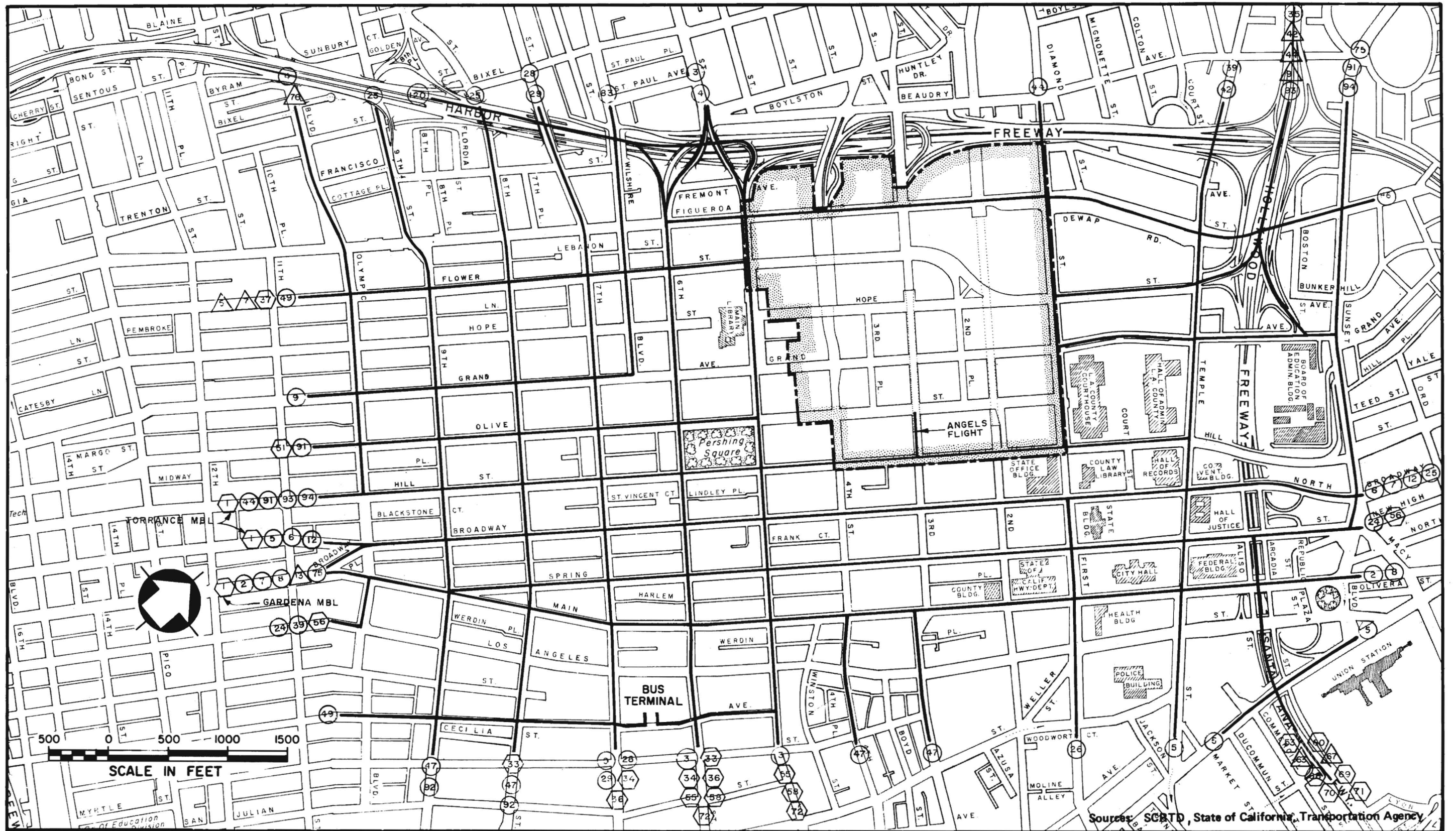
-  TRAFFIC - 1966-1967 ACTUAL
-  TRAFFIC - 1967 ESTIMATED
-  TRAFFIC - PROJECT GENERATED
- 1.00** FUTURE VOLUME/CAPACITY RATIO (BUSES EXCLUDED)

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**OUTBOUND PM  
 PEAK HOUR TRAFFIC  
 FREEWAY RAMP AND  
 PROJECT PERIMETER**

EXHIBIT **7**



Sources: SCS&TD, State of California, Transportation Agency

**LEGEND**

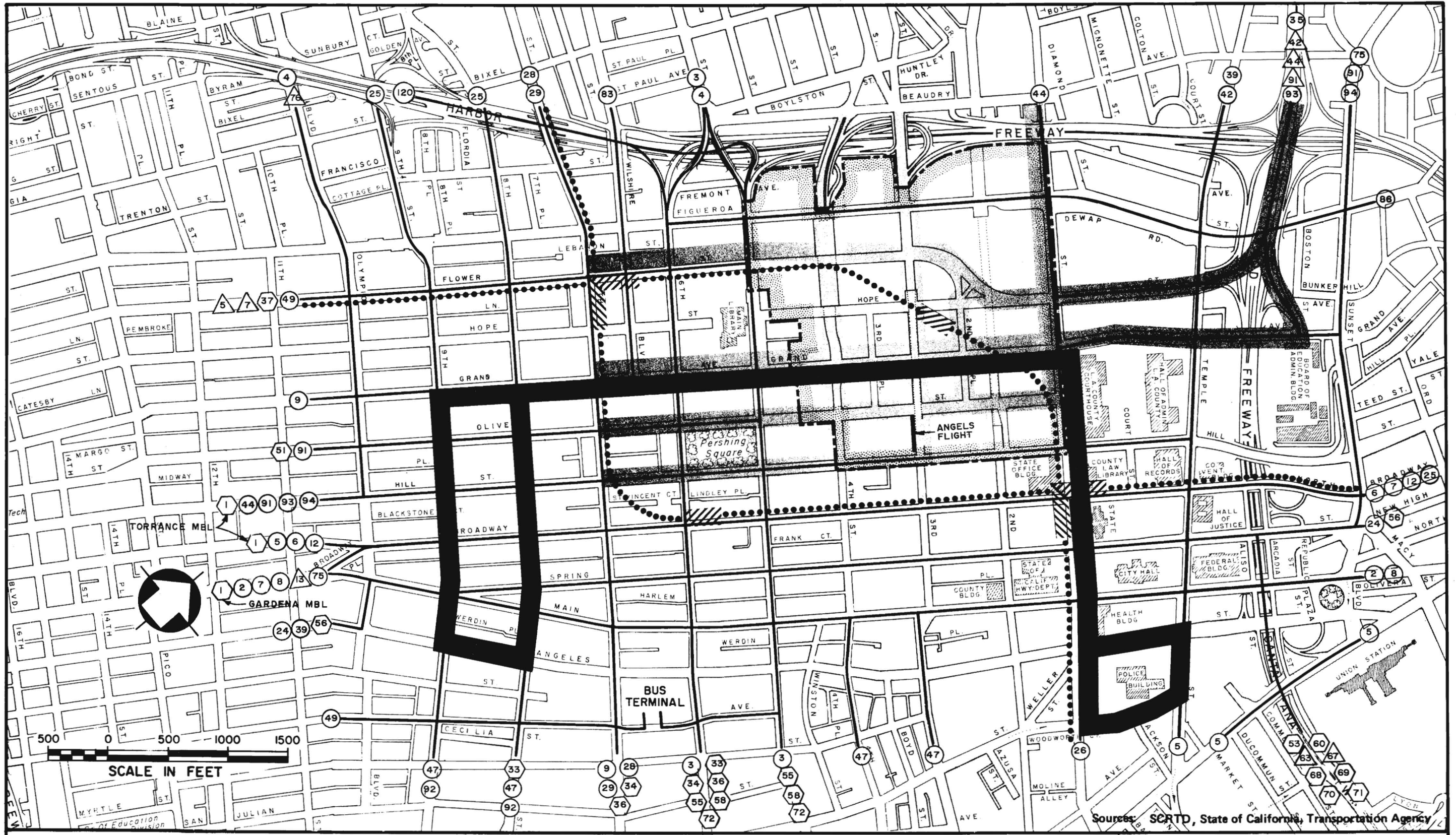
-  BUS ROUTE
-  LOCAL LINE
-  SUBURBAN LINE
-  FREEWAY FLYER

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**EXISTING TRANSIT SERVICE**



Sources: SCRTD, State of California, Transportation Agency

**LEGEND**

- BUS ROUTE
- LOCAL LINE
- SUBURBAN LINE
- FREEWAY FLYER

- PROPOSED BUS ROUTE - PHASE I
- POSSIBLE BUS ROUTES - PHASE II
- POSSIBLE FUTURE RAPID TRANSIT

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**FUTURE TRANSIT SERVICE**

EXHIBIT