LOS ANGELES
CENTRAL BUSINESS DISTRICT
PEDESTRIAN STUDY

D R A F T R E P O R T

Prepared for
COMMUNITY REDEVELOPMENT AGENCY
of the
CITY OF LOS ANGELES

BARTON-ASCHMAN ASSOCIATES, INC.

February 1986

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1.

INTRODUCTION

Currently, plans are being made for the construction of the Metro Rail transit system that will serve downtown Los Angeles. Metro Rail is proposed as an 18.6-mile rapid rail system connecting the central business district (CBD) and the San Fernando Valley. It is anticipated that the implementation of the Metro Rail system will affect the pedestrian circulation patterns in downtown Los Angeles. In addition, the expected shift in pedestrian flow patterns will also be influenced by the immense new development planned for the downtown vicinity. It is expected that the combination of these two factors will: (1) increase the pedestrian activity downtown and (2) redistribute the existing pedestrian traffic.

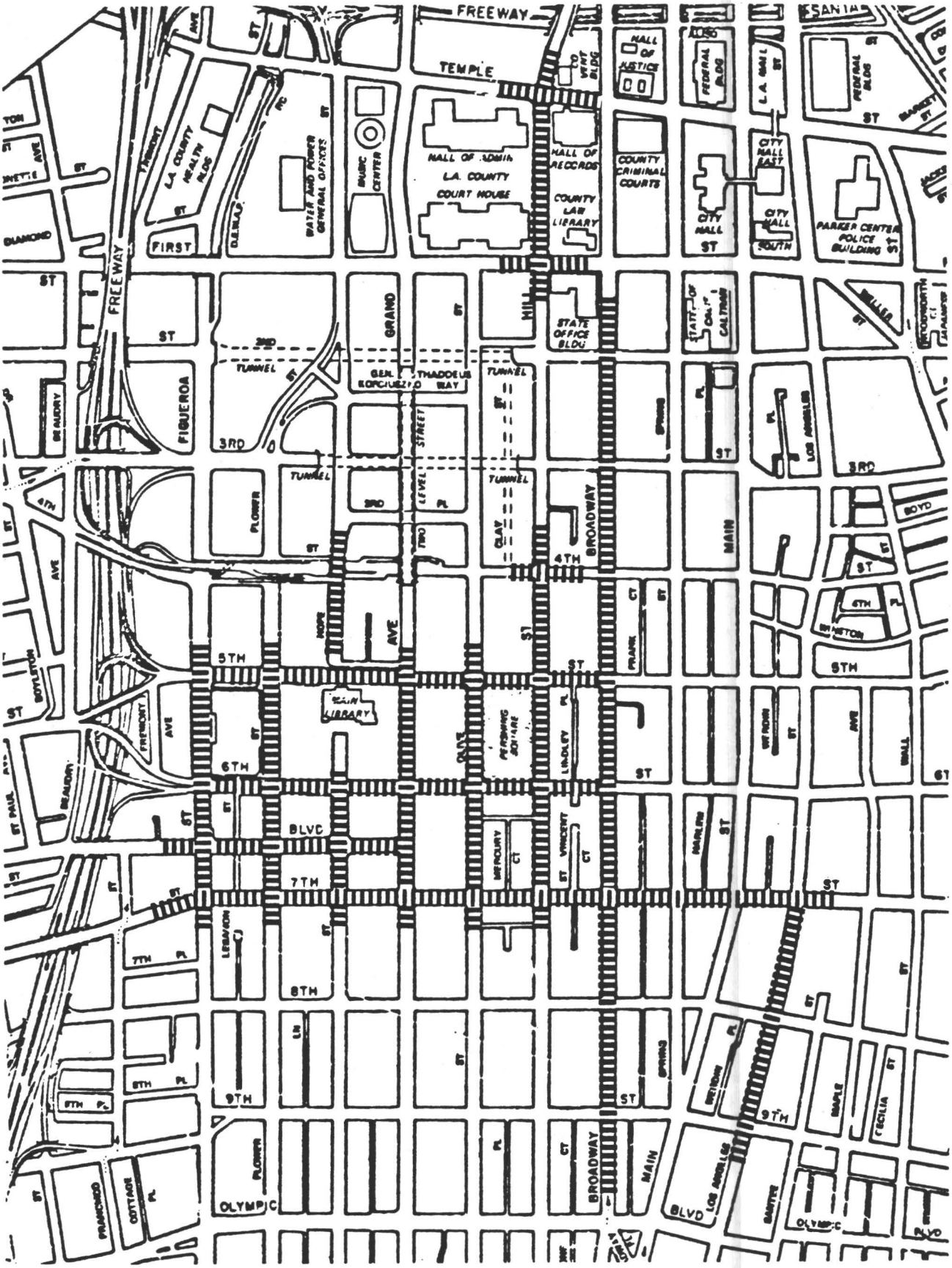
Barton-Aschman Associates, Inc. was retained by the Community Redevelopment Agency of Los Angeles (CRA) to evaluate the impacts that the Metro Rail system and the projected development-generated pedestrian activity would have on the future volume of pedestrian activity in downtown Los Angeles. This report represents an expansion of a draft report prepared for CRA by

Wilbur Smith and Associates (WSA), Pedestrian Studies of Metro Rail Station Areas (September, 1984). As indicated by the title, that report focused on the areas surrounding the three proposed downtown Metro Rail stations. Significant portions of the data used in this report are derived from the WSA report, as are the Metro Rail area analysis results. Further, the methodology used here is the same as that developed for use in the WSA analyses. Consequently, some portions of that report have been incorporated directly into the text of this document.

STUDY AREAS

The study areas analyzed here are shown in Figure 1 and include the following general locations:

- The Civic Center Metro Rail Station on Hill Street between Temple Street and First Street;
- The Hill Street Metro Rail Station on Hill Street between Fourth Street and Fifth Street;
- The Seventh Street Metro Rail Station on Seventh Street between Grand Avenue and Figueroa Street;
- Hill Street between Sixth Street and Seventh Street (Jewelry District);
- Broadway between Third Street and Ninth Street;



STUDY AREA

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FIGURE 1

- Los Angeles Street between Seventh Street and Ninth Street (Garment District); and

- Seventh Street between Olive Street and Los Angeles Street.

PREVIOUS STUDIES

The methodology employed in this study builds upon previous pedestrian planning studies performed in downtown Los Angeles. In 1982, Wilbur Smith and Associates performed the Seventh Street Retail Concourse Pedestrian Study. Prior to that (in 1973), the City of Los Angeles Department of Transportation completed the Mid-Block Pedestrian Study.

2.

EXISTING CONDITIONS

This chapter describes existing conditions in the study area, including existing facilities and volume figures throughout the study area. Also, the quality of existing pedestrian flow is evaluated for both crosswalks and mid-block conditions.

EXISTING PEDESTRIAN FACILITIES

Existing sidewalk facilities, traffic control devices, and parks are described below.

Sidewalks - There are sidewalks present on both sides of the streets within the study area with the exception of the Pershing Square Block. This block is bounded by Hill, Olive, Fifth, and Sixth Streets and has diagonal sidewalks leading to pedestrian paths which are set back away from the bordering streets. Sidewalk widths, as well as curb-to-curb roadway widths, vary from block to block. Generally, sidewalks are 12 - 15 feet wide, though they may be as narrow as seven feet wide (as on the south side of Fourth Street

between Hill and Olive Streets, for example) or as wide as 23.5 feet (as on Seventh Street east of Flower Street, in front of Broadway Plaza). Appendix A illustrates the existing sidewalk widths in the study area.

Traffic Control Devices - All of the intersections within the study area are controlled by traffic signals with WALK/DON'T WALK pedestrian signal indications. There are also midblock traffic signals on each block of Hill Street between Temple and Seventh Streets. Pedestrian buttons on either side of Hill Street activate these signals.

Each approach of each study area intersection has a crosswalk present. In addition, there are crosswalks located at midblock signals along Hill Street, Broadway, and Los Angeles Street, as well as on Grand Avenue and Olive Street between Fifth and Sixth Streets.

Parks and Plazas - There are several parks and plazas located within the study area. These include Pershing Square (which is located above the Pershing Square underground parking garage), the Court of Flags Plaza in the Civic Center area, and the Broadway Plaza.

EXISTING MIDBLOCK PEDESTRIAN CONDITIONS

Midblock pedestrian volumes were determined for both sides of the street on all streets within the study area. The total number of pedestrians traveling in both directions passing a point near the middle of the block was counted to establish the midblock pedestrian volume.

Data Collection

Midblock pedestrian counts were performed throughout the study area with the exception of the Metro Rail station locations. The midblock pedestrian counts for those areas were obtained from Pedestrian Studies of Metro Rail Station Areas prepared by Wilbur Smith and Associates for the CRA.

The midblock pedestrian counts were conducted during the midday peak period (11:00 AM - 2:00 PM) and the PM peak period (3:00 PM - 6:00 PM). Seven-minute pedestrian counts were taken at each midblock location. Following each seven-minute count, three minutes were allowed for the field personnel to travel to the next location. This seven-minute interval was chosen to coincide with the 70-second traffic signal cycles downtown.(1) (During each seven-minute period, exactly six signal cycles would occur.) Using this method, each surveyor was able to perform counts at six locations each hour.

Within each portion of the study area, a control count was performed by counting one location for the entire time period. This count was used to factor up the midblock pedestrian counts from seven-minute volumes to hourly volumes, as well as determine the peak hour of pedestrian traffic in each portion of the study area.

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(1) As stated in Pedestrian Studies of Metro Rail Station Areas by Wilbur Smith and Associates, these short seven-minute counts have been found to accurately reflect hourly volumes in previous pedestrian studies (p. 2-4).

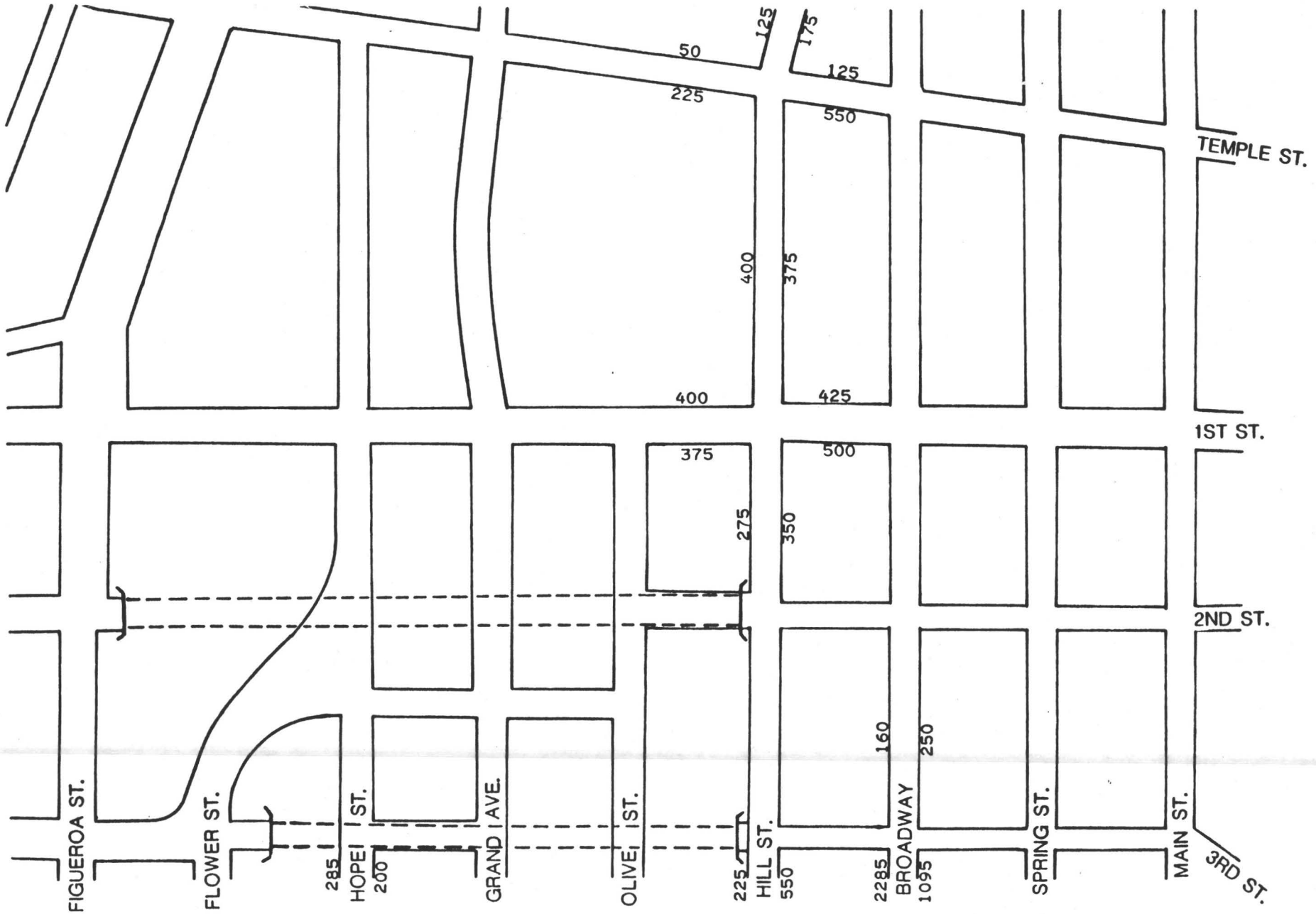
Peak-Hour Volumes

As described above, peak-hour volumes were determined for all midblock locations within the study area by factoring up the seven-minute pedestrian counts based on the results of the control counts. Figures 2A-2C illustrate the existing midblock peak-hour volumes for the midday peak hour. Figures 3A-3C show the existing midblock pedestrian volumes for the PM peak hour.

Existing Midblock Pedestrian Flow Analysis

The analysis of existing midblock pedestrian conditions involved determination of a measure known as quality of flow at each midblock location. The quality-of-flow concept was developed by Pushkarev and Zupan in Urban Space for Pedestrians (MIT Press, 1975). The seven quality-of-flow categories developed by Pushkarev and Zupan for pedestrians are described in Table 1. These categories are based on the density and flow rate of pedestrians in relation to the capacity of sidewalks. The threshold of impeded flow (2.0 pedestrians/foot/minute) has been recommended by Pushkarev and Zupan as the design standard for office areas. In retail areas, the midpoint of impeded flow (4.0 pedestrians/foot/minute) is suggested as the appropriate design level. Note that these quality of flow categories apply to average flows over a period lasting 15 minutes or more. Also, the effects of platooning, as is often caused by traffic signals in downtown areas, can result in reductions in quality of flow. Typically, platooning will cause the quality of flow to decline by one level.

In order to calculate the quality of flow at each midblock location, it was necessary to determine the "effective width" at each location. Sidewalk width measurements were taken at each midblock location. The "effective widths" were then determined by reducing the total sidewalk width based on



EXISTING MIDDAY PEAK HOUR MIDBLOCK PEDESTRIAN VOLUMES

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FIGURE 2A

EXISTING MIDDAY PEAK HOUR MIDBLOCK PEDESTRIAN VOLUMES

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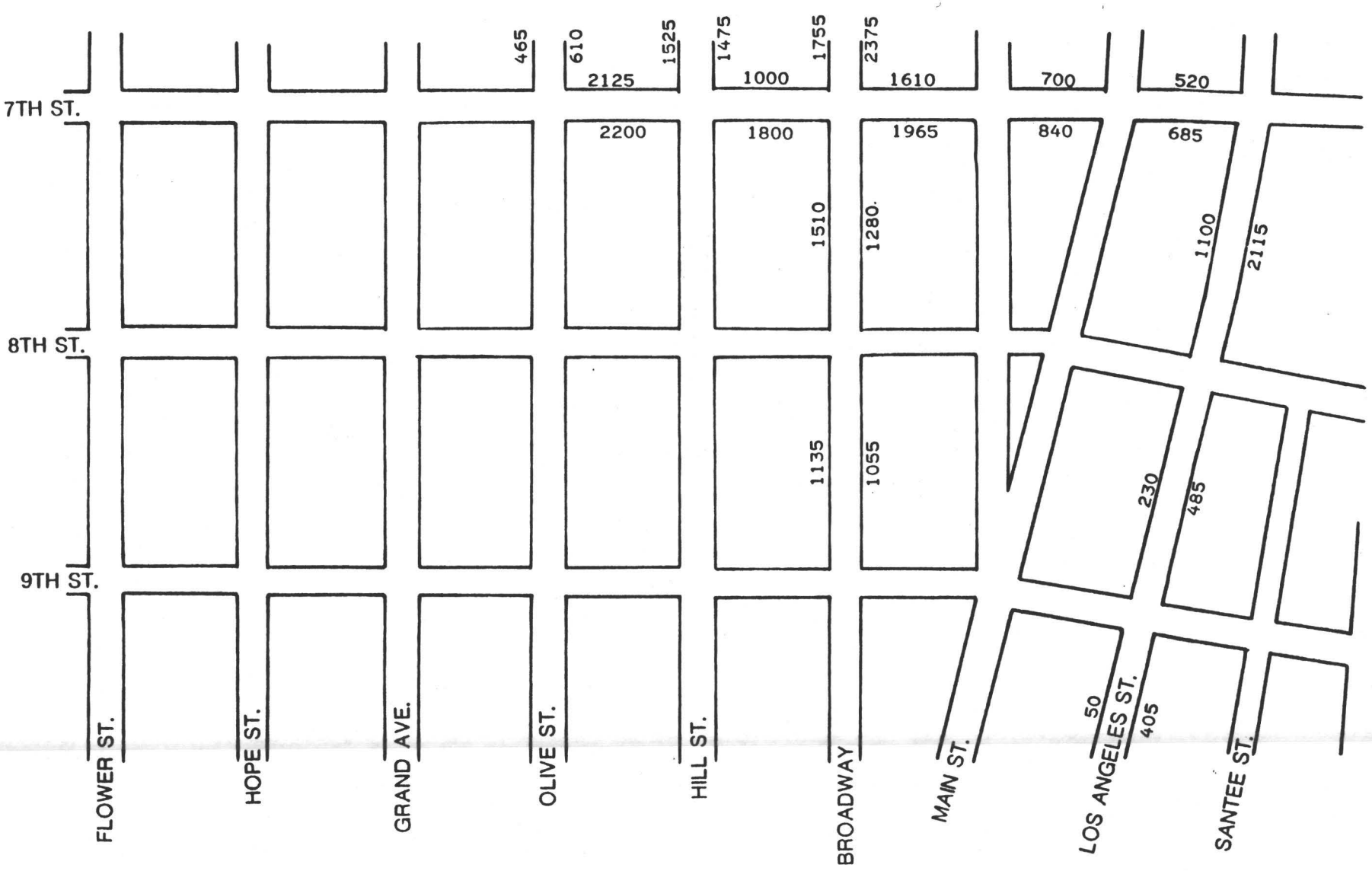
LEGEND: * CONSTRUCTION

FIGURE 2B



EXISTING MIDDAY PEAK HOUR MIDBLOCK PEDESTRIAN VOLUMES

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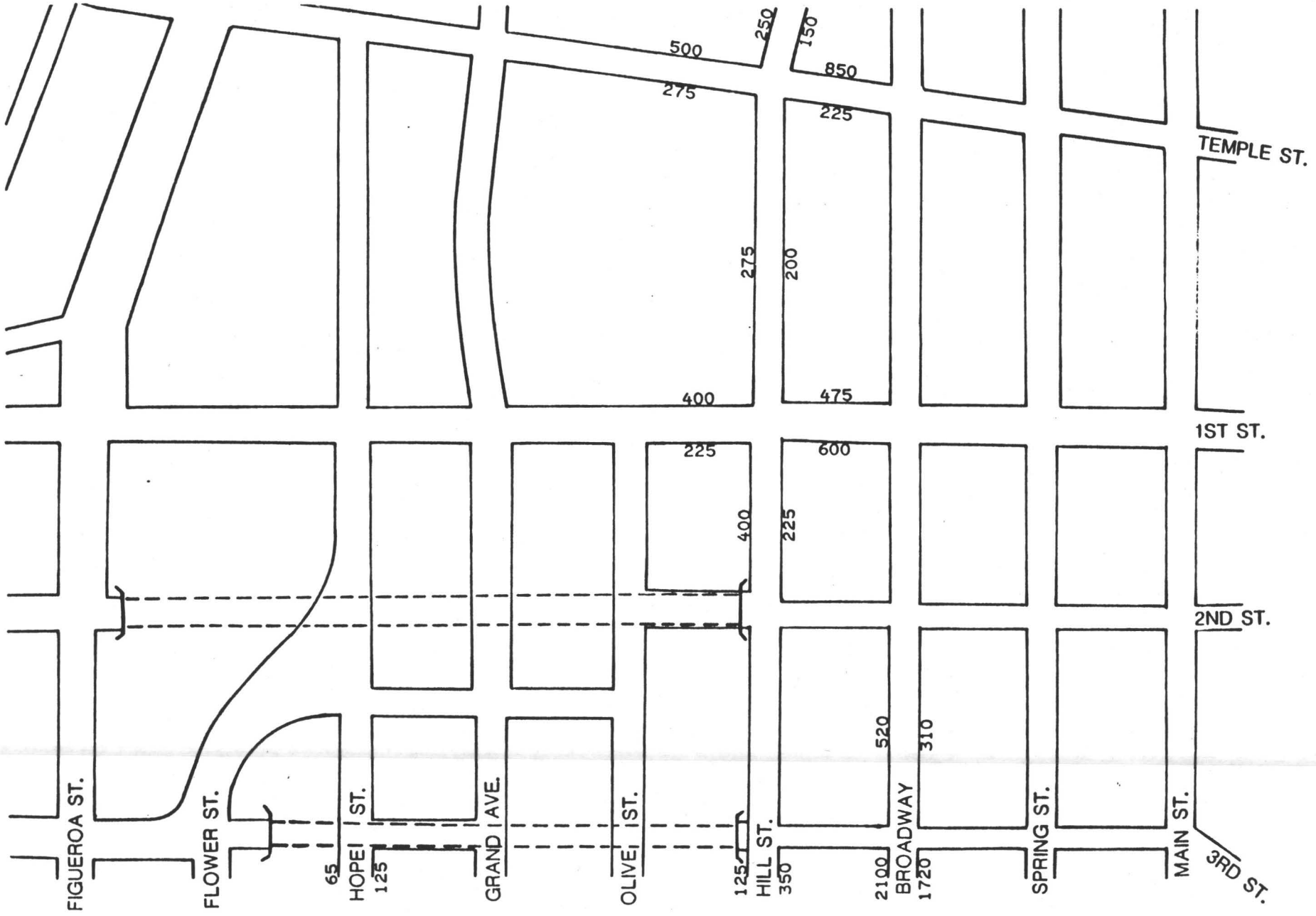
FIGURE 2C



EXISTING P.M. PEAK HOUR MIDBLOCK PEDESTRIAN VOLUMES

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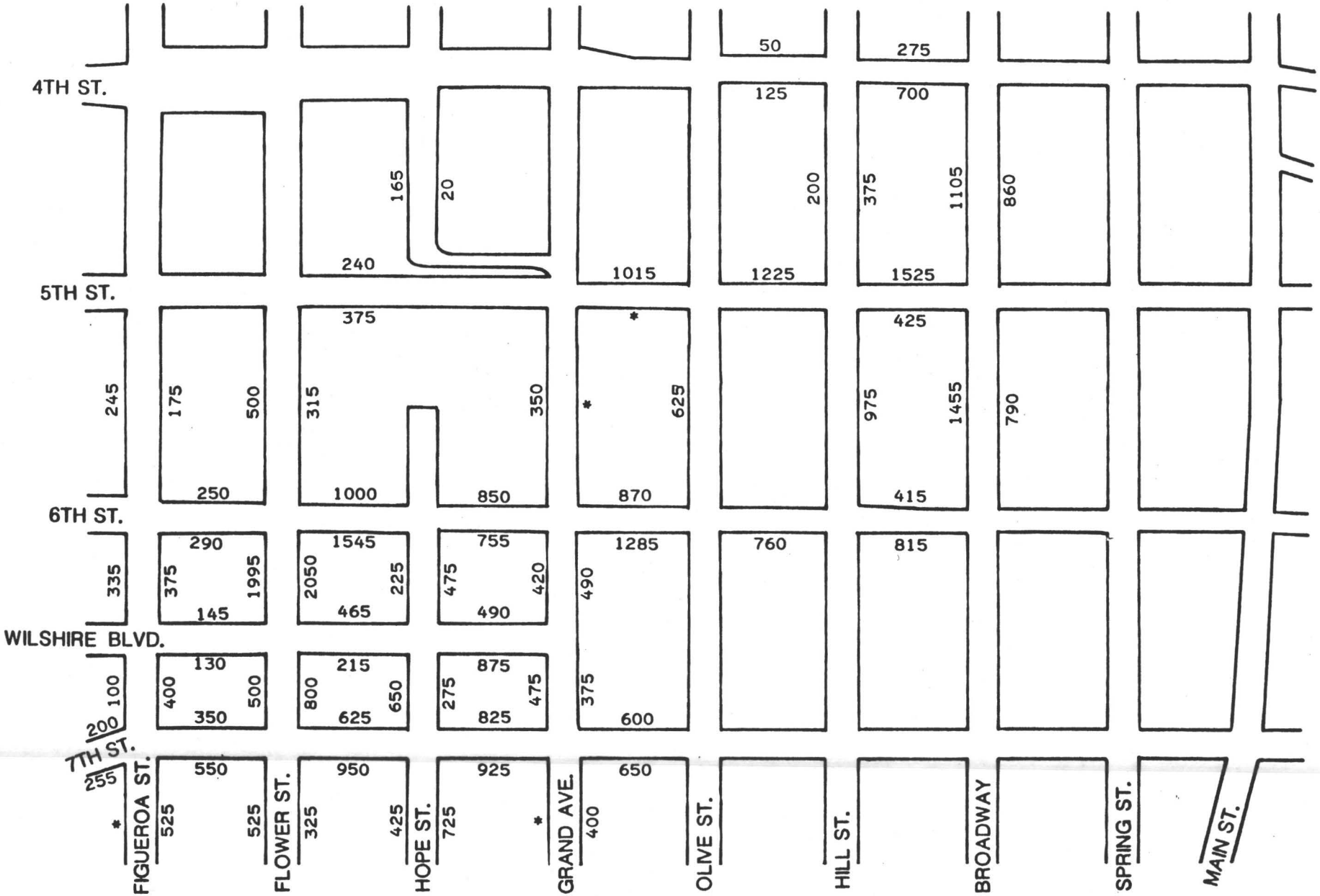
FIGURE 3A



EXISTING P.M. PEAK HOUR MIDBLOCK PEDESTRIAN VOLUMES

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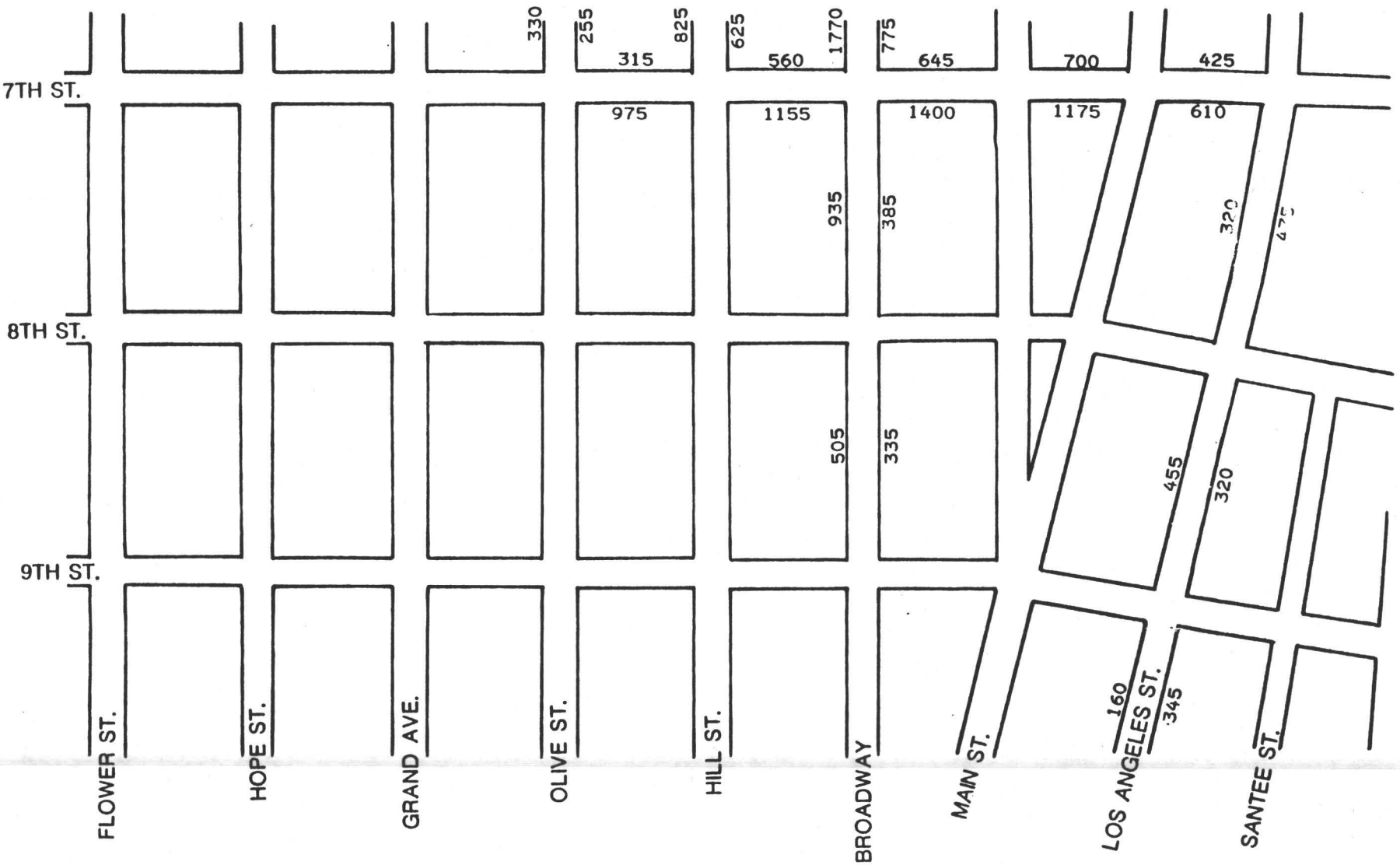
LEGEND: * CONSTRUCTION

FIGURE 3B



EXISTING P.M. PEAK HOUR MIDBLOCK PEDESTRIAN VOLUMES

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FIGURE 3C

TABLE 1

PEDESTRIAN QUALITY OF FLOW CHARACTERISTICS[1]

Quality of Flow	Definition
Open	No interaction among pedestrians occurs at this level. Pedestrian flow rate is less than 0.50 P/F/M.[2]
Unimpeded	Some bunching may begin to occur. A pedestrian is generally not influenced by the pedestrian traffic flow. Pedestrian flow rate is between 0.50 - 2.00 P/F/M.
Impeded	Pedestrian progress is possible only with constant interaction with the movement of others. Pedestrian flow rate is between 2.0 - 6.0 P/F/M.
Constrained	Speed is limited and conflicts occur between pedestrians. Interaction turns into physical restrictions on the freedom of movement. The flow rate is between 6.0 - 10.0 P/F/M.
Crowded	This level of flow is seldom reached and is more typical of very heavily used transportation terminals. Pedestrian movement may be fluid; however, there is friction between individuals traveling at a slow speed. The flow rate is between 10.0 - 14.0 P/F/M.
Congested	At this level, there is increased friction between individuals and it is very difficult to obtain a normal flow rate. The pedestrian flow rate is between 14.0 - 18.0 P/F/M.
Jammed	Flow is near the maximum possible level. Pedestrian movement rate is 18.0 - 25.0 P/F/M.

NOTES:

(1) Quality of flow characteristics based on Urban Space for Pedestrians, Pushkarev and Zupan, MIT Press, 1975.

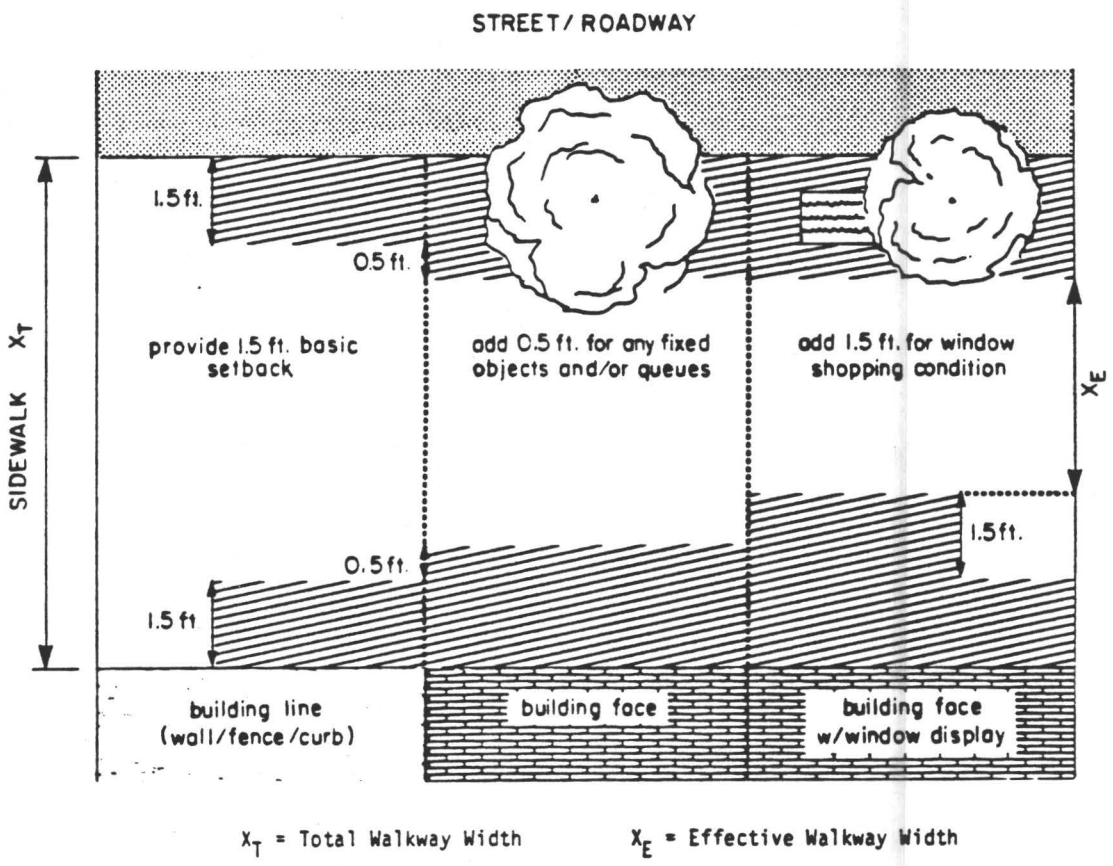
(2) Pedestrians per foot of effective sidewalk width per minute.

the considerations shown in Figure 4. These reductions are intended to reflect the actual effective width used by pedestrians and eliminate from consideration that part of the sidewalk obstructed by stationary objects (e.g., light posts, bus shelters, etc.) or by pedestrians (e.g., window shopping, etc.). Appendix B illustrates the existing effective widths on study area sidewalks.

It was then necessary to determine a peak pedestrian flow rate at each midblock location. The peak pedestrian flow rate is expressed in terms of pedestrians per foot of effective sidewalk width per minute, or P/F/M. Once the flow rates were calculated, the quality of flow at each location was determined based on the seven quality-of-flow categories listed in Table 1.

Figures 5A - 5D illustrate the existing quality of flow at each midblock location during the midday peak hour. The existing midblock quality of flow during the PM peak hour is shown in Figures 6A - 6D.

The highest existing midday peak-hour midblock pedestrian volume occurs on the east side of Hope Street between Wilshire Boulevard and Seventh Street. At this location, the pedestrian volume is approximately 3,500 pedestrians per hour (Figure 2B), and the quality of flow is constrained (Figure 5C). The lowest midday peak-hour midblock pedestrian volume occurs on the north side of Temple Street, just west of Hill Street, and on the west side of Los Angeles Street south of Ninth Street. There are only 50 pedestrians per hour (Figures 2A and 2C), and the quality of flow at these locations is open (Figures 5A and 5D). Generally, in the northern portion of the study area pedestrian flows are open or unimpeded. Along much of Broadway flows are impeded. Similar conditions exist along the south side of Sixth Street, as well as along much of Seventh Street.



X_T = Total Walkway Width X_E = Effective Walkway Width

EFFECTIVE SIDEWALK WIDTH CONSIDERATIONS

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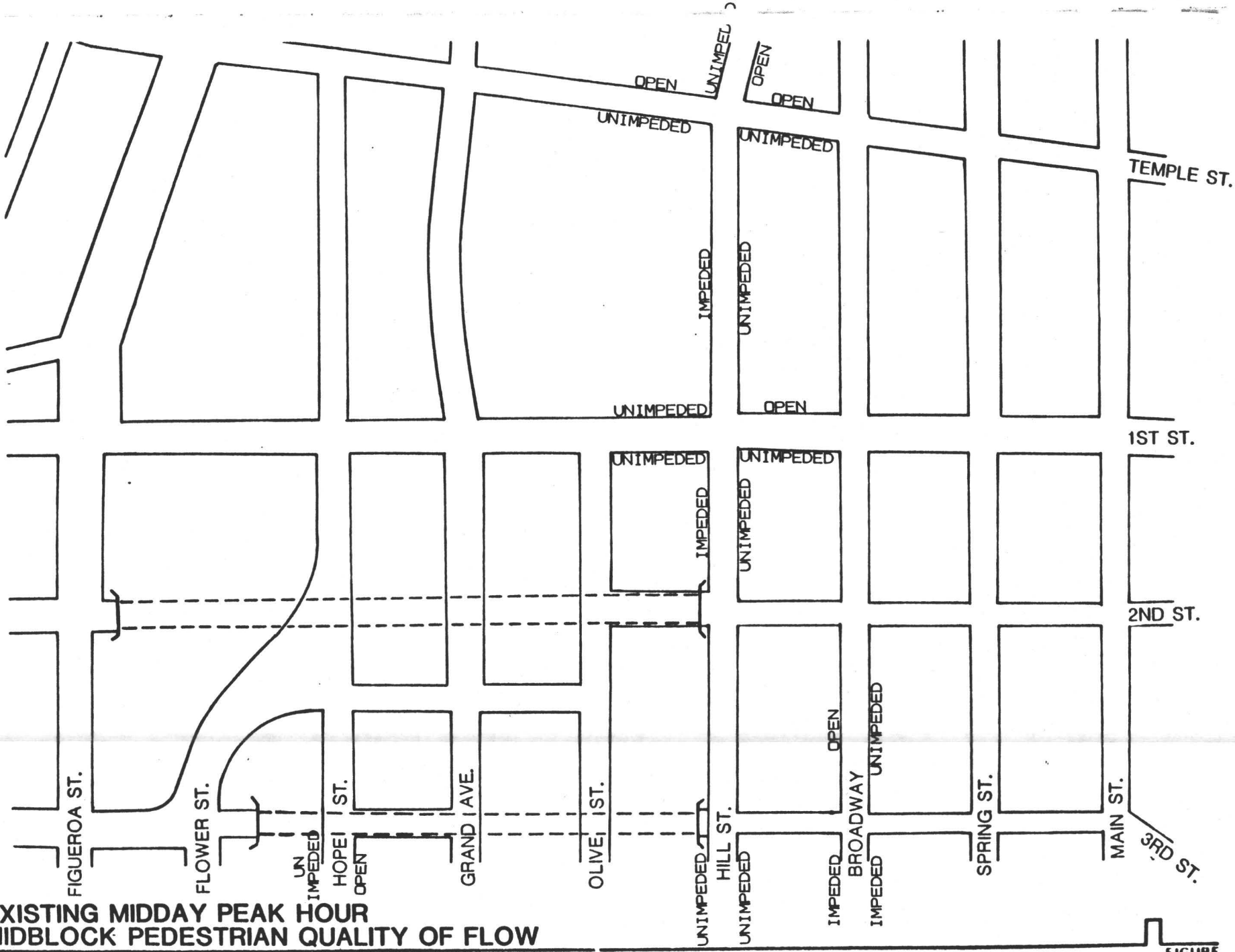
FIGURE 4



EXISTING MIDDAY PEAK HOUR
MIDBLOCK PEDESTRIAN QUALITY OF FLOW

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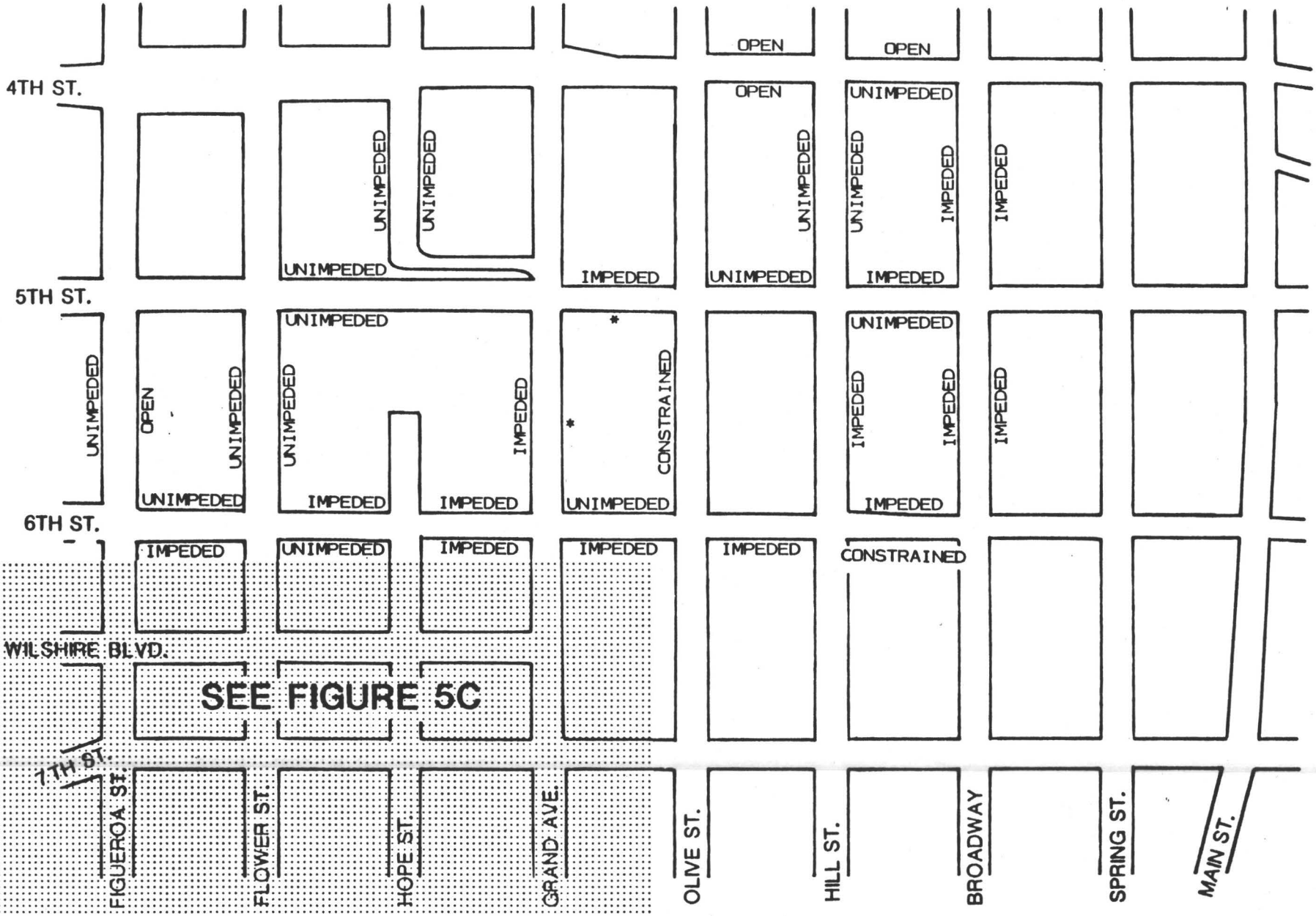
FIGURE
5A



EXISTING MIDDAY PEAK HOUR MIDBLOCK QUALITY OF FLOW

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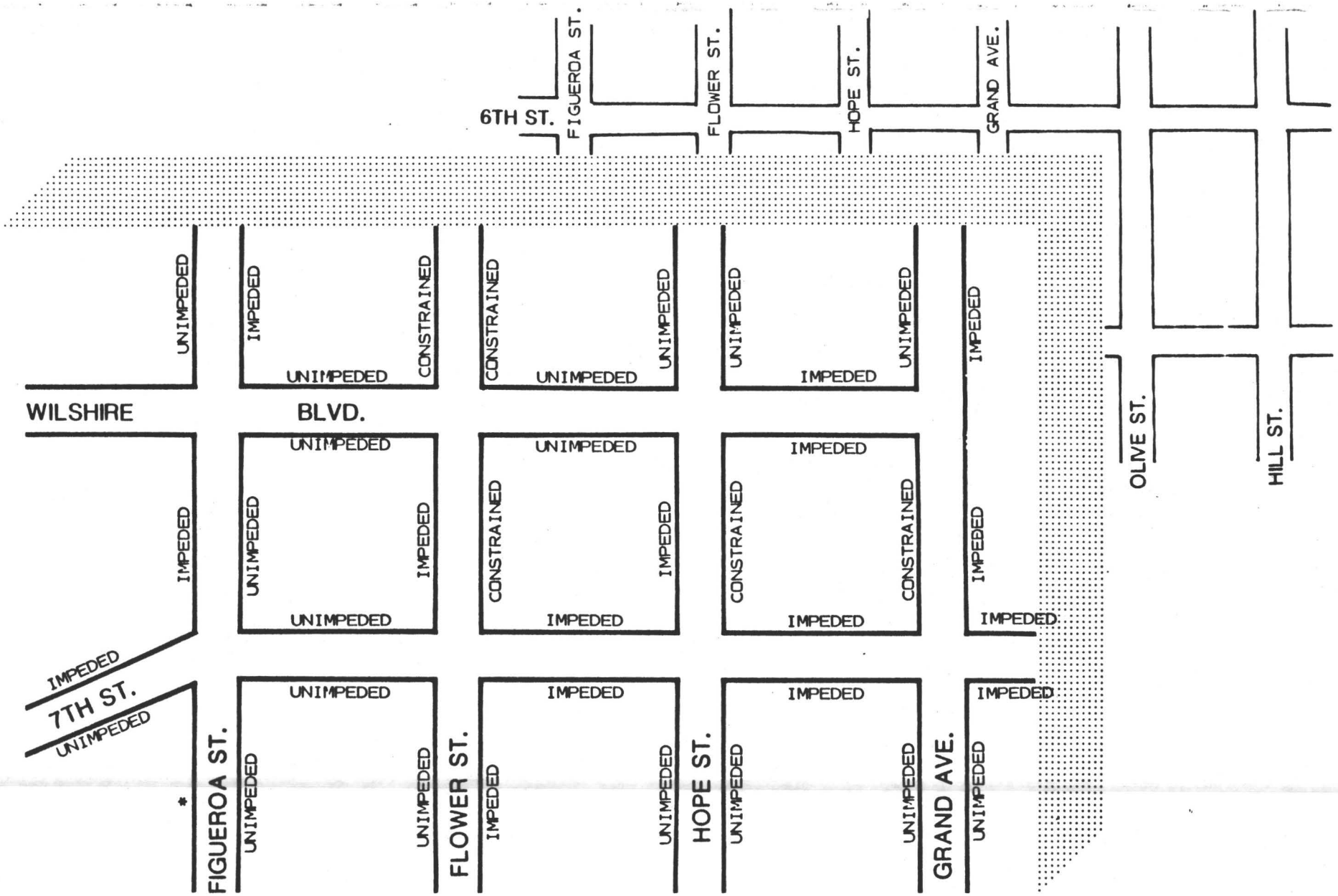
LEGEND: * CONSTRUCTION

FIGURE 5B



EXISTING MIDDAY PEAK HOUR MIDBLOCK QUALITY OF FLOW

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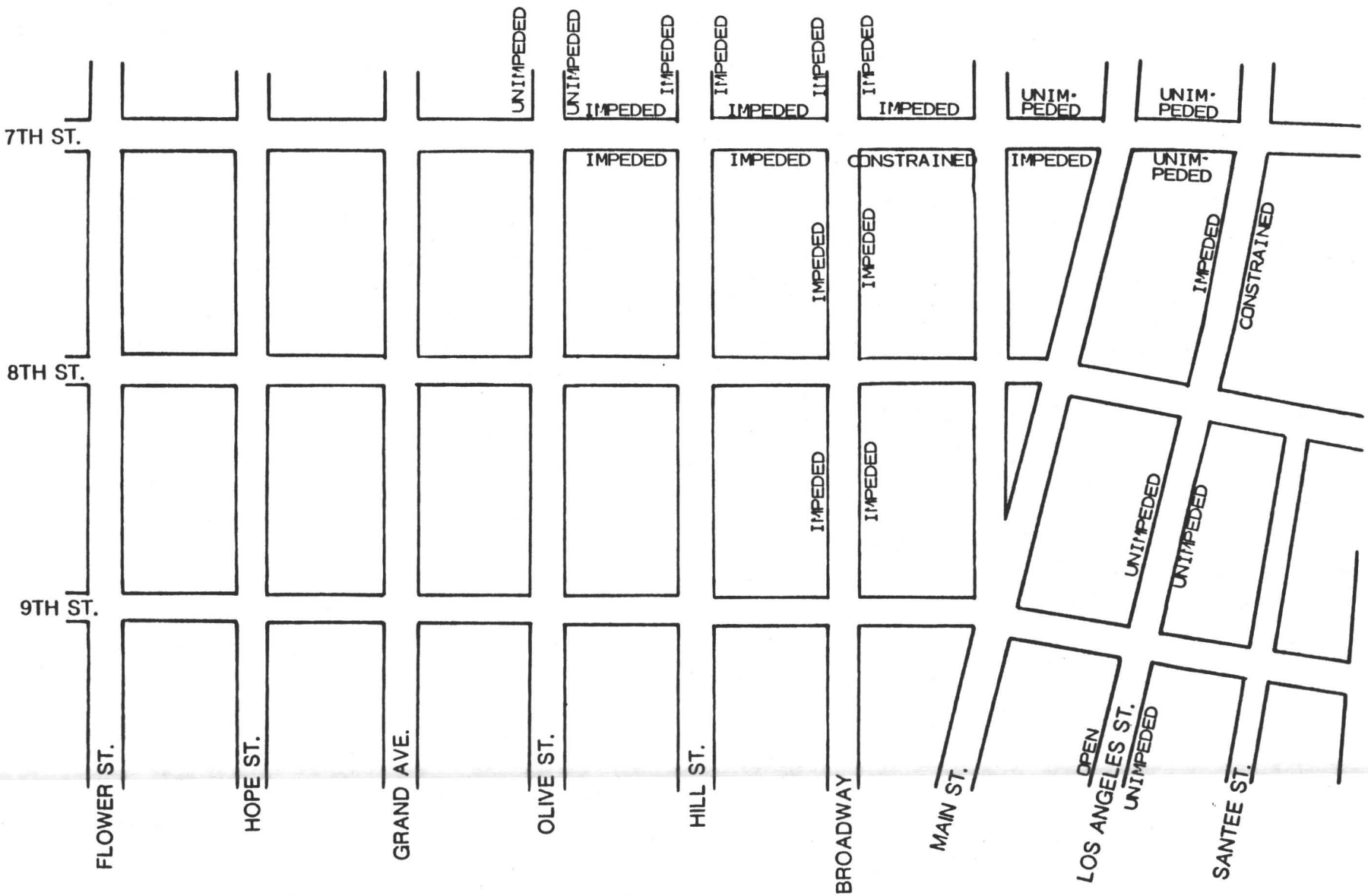
LEGEND: *CONSTRUCTION

FIGURE 5C



EXISTING MIDDAY PEAK HOUR MIDBLOCK PEDESTRIAN QUALITY OF FLOW

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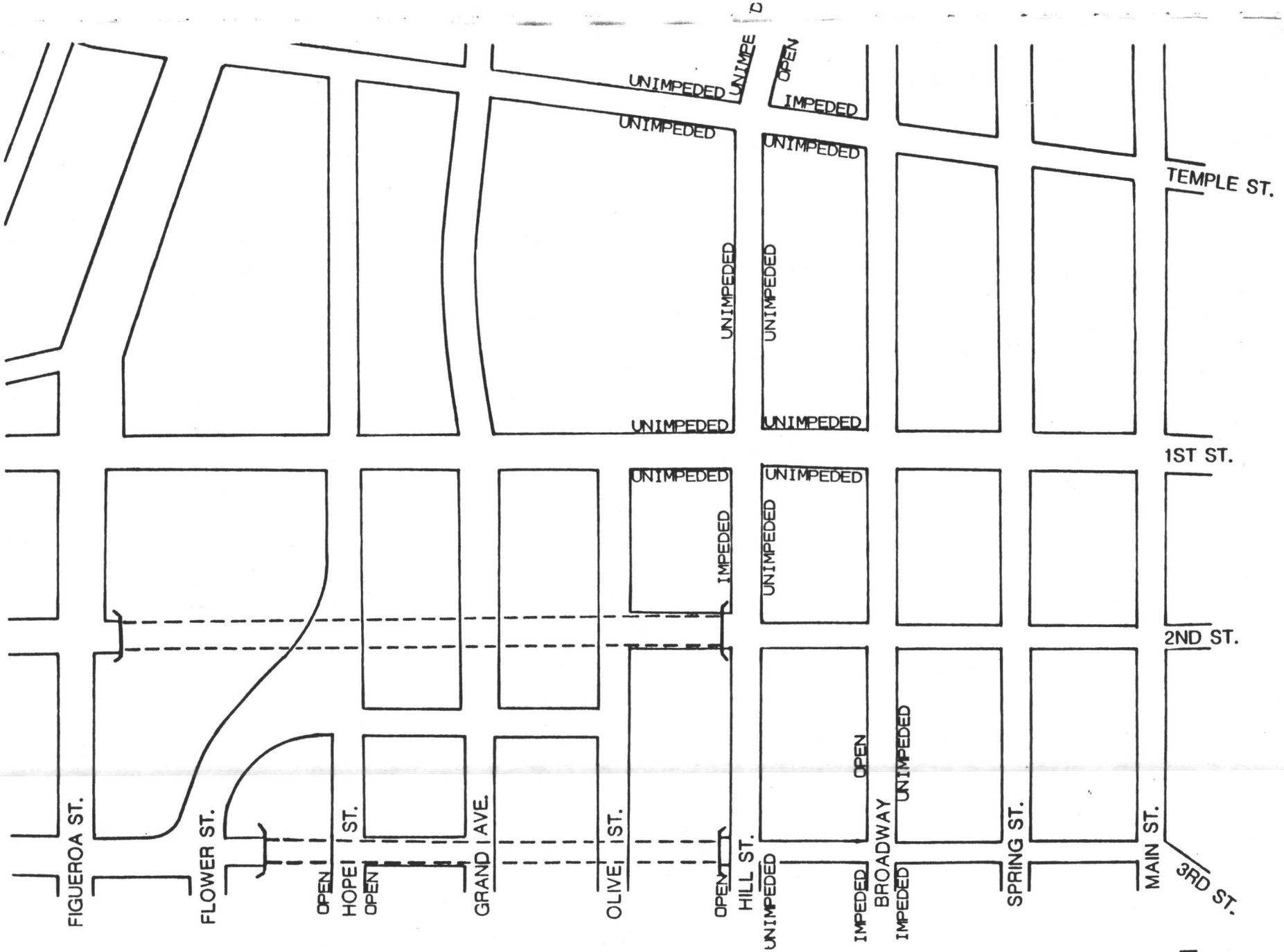
FIGURE 5D



EXISTING P.M. PEAK HOUR MIDBLOCK PEDESTRIAN QUALITY OF FLOW

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FIGURE 6A

EXISTING P.M. PEAK HOUR MIDBLOCK PEDESTRIAN QUALITY OF FLOW

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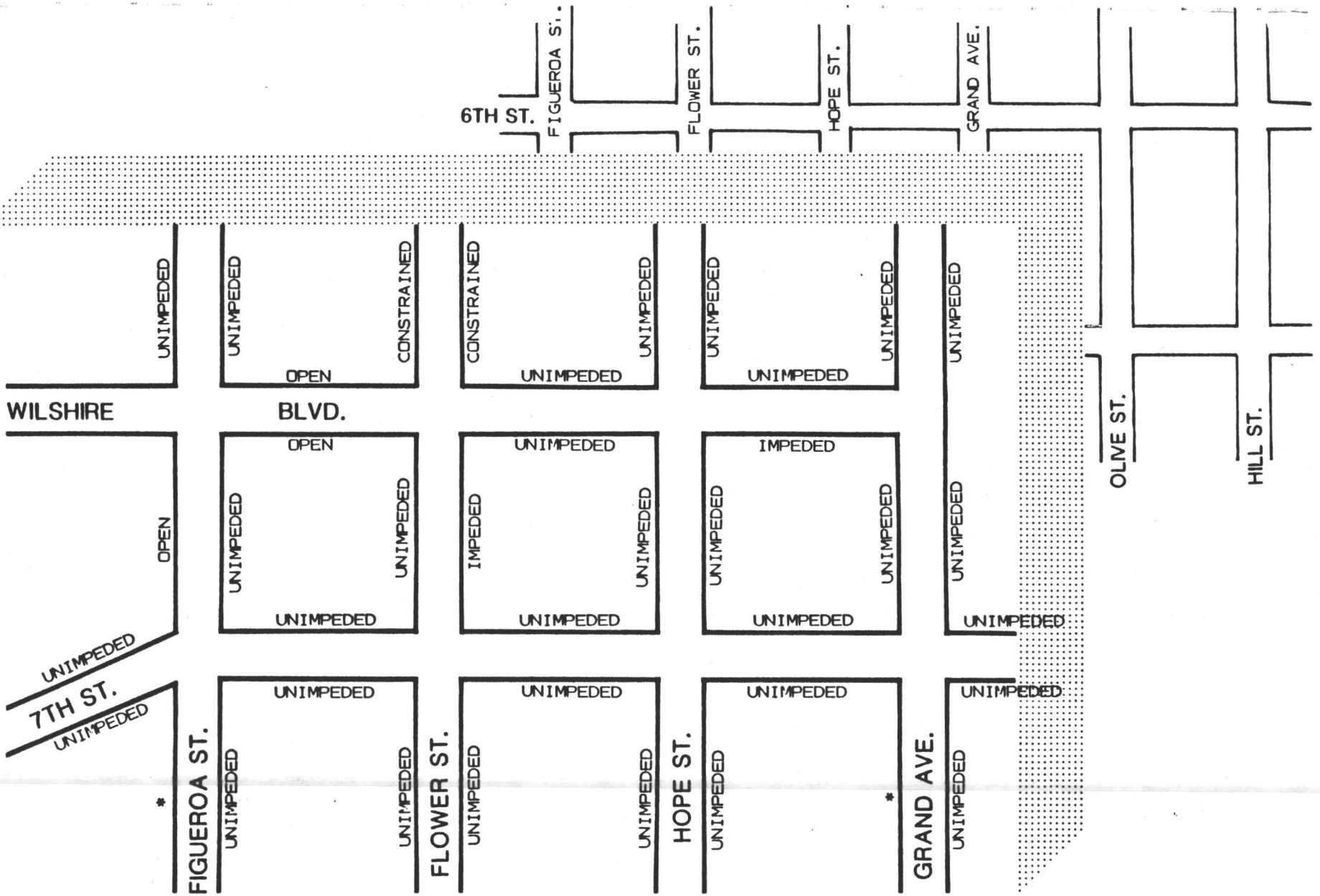
LEGEND: * CONSTRUCTION

FIGURE 6B



EXISTING P.M. PEAK HOUR
MIDBLOCK PEDESTRIAN QUALITY OF FLOW

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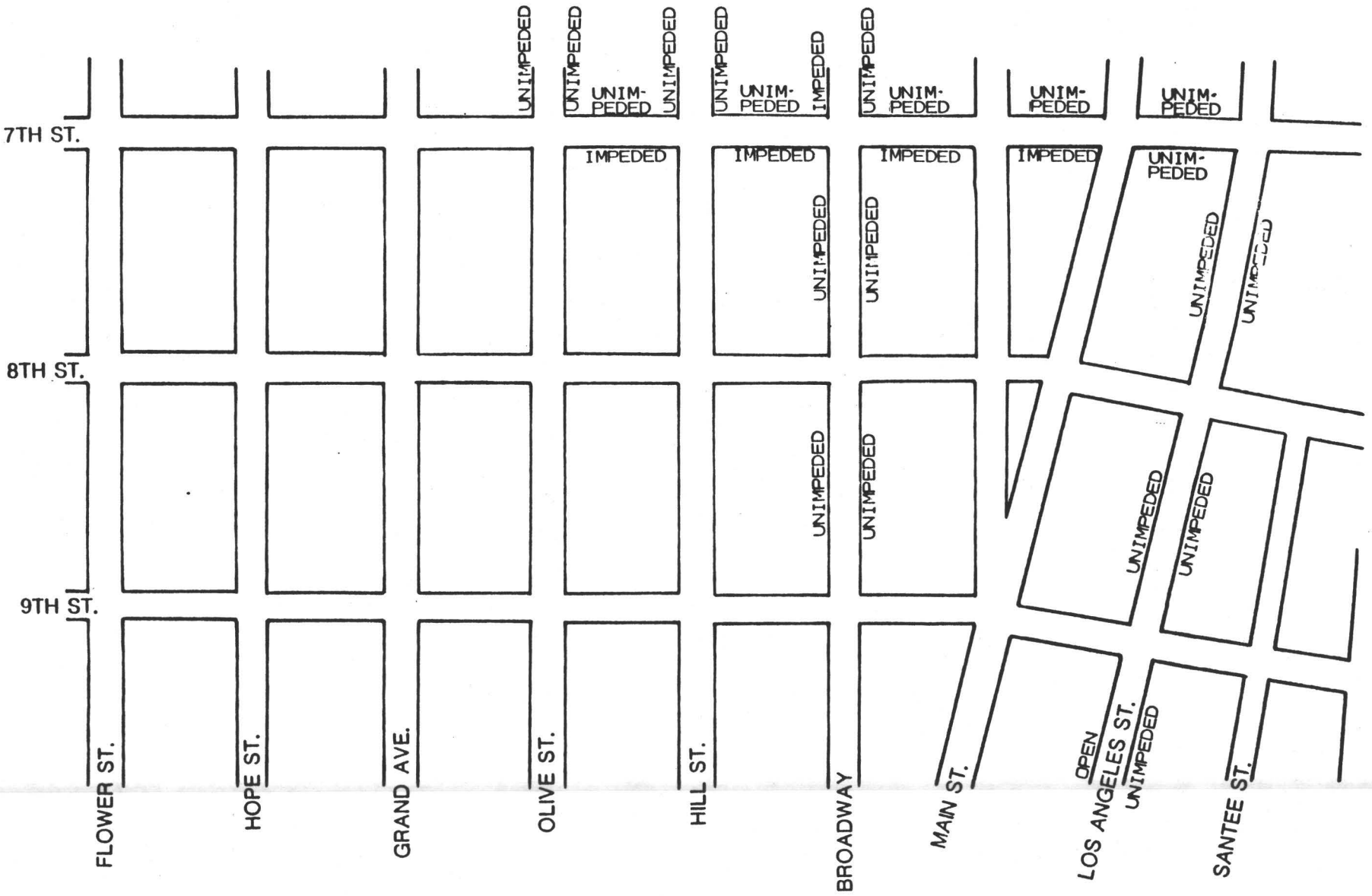
LEGEND: * CONSTRUCTION

FIGURE 6C



EXISTING P.M. PEAK HOUR MIDBLOCK PEDESTRIAN QUALITY OF FLOW

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FIGURE 6D

In the evening peak hour, the highest existing pedestrian volume is located on the west side of Broadway between Third and Fourth Streets. The pedestrian volume there is 2,100 pedestrians per hour (Figure 3A), and the quality of flow is impeded (Figure 6A). Pedestrian flows along Flower Street between Sixth Street and Wilshire Boulevard are "constrained," though the volumes are slightly lower than on Broadway. The lowest PM peak-hour pedestrian volume is experienced on the east side of Hope Street between Fourth and Fifth Streets where there are approximately 20 pedestrians per hour (Figure 3B). The quality of flow is open at this location (Figure 6B). Again, the northern part of the CBD generally has open or unimpeded conditions. Flows along Broadway are improved to unimpeded. Along Fifth and Sixth Streets, pedestrians experience either unimpeded or impeded conditions. Similarly, most of Seventh Street is unimpeded, except on the south side between Hope Street and Main Street.

Existing midday peak-hour pedestrian volumes are in general higher than PM peak-hour pedestrian volumes.

EXISTING PEDESTRIAN CROSSWALK CONDITIONS

Two-direction pedestrian counts were performed at all of the crosswalk locations within the study area. The pedestrian quality of flow at each crosswalk was determined based upon these counts and evaluation techniques described in Interim Materials on Highway Capacity (Transportation Research Circular No. 212, January, 1980).

Data Collection

As at the midblock locations, existing pedestrian counts were conducted at the crosswalks within the study area during the midday peak period (11:00 AM

- 2:00 PM) and the PM peak period (3:00 PM - 6:00 PM). The pedestrian volumes for the crosswalks located in the Metro Rail Station Areas were obtained from the Pedestrian Studies of Metro Rail Station Areas report prepared for the CRA by Wilbur Smith and Associates.

As at the midblock locations, seven-minute counts were conducted at each of the crosswalk locations. These seven-minute counts were expanded to hourly volumes based on the methodology used to factor up the midblock counts explained previously. Figures 7A - 7C show the existing crosswalk midday peak-hour volumes. The existing PM peak-hour crosswalk pedestrian volumes are illustrated in Figures 8A - 8C.

Existing Pedestrian Crosswalk Flow Analysis

The determination of crosswalk level of service consists of knowing the two-direction peak 15-minute pedestrian volume and adjusting this volume for platooning caused by signal delay. Because of signal phasing at intersections, pedestrians who arrive at the corner while the light is red must wait to cross the street. Once the light turns green, the pedestrians attempt to cross the street as a group (platoon).

The peak 15-minute pedestrian volumes were factored up by the ratio of the total signal time to cross time minus three seconds. The cross time is the part of the signal cycle in which pedestrians can cross the street. The cross time was determined at all of the crosswalk locations by Barton-Aschman Associates, Inc. Three seconds is subtracted from the cross time due to the pedestrian start-up delay prior to beginning to cross the street.

EXISTING MIDDAY PEAK HOUR CROSSWALK PEDESTRIAN VOLUMES

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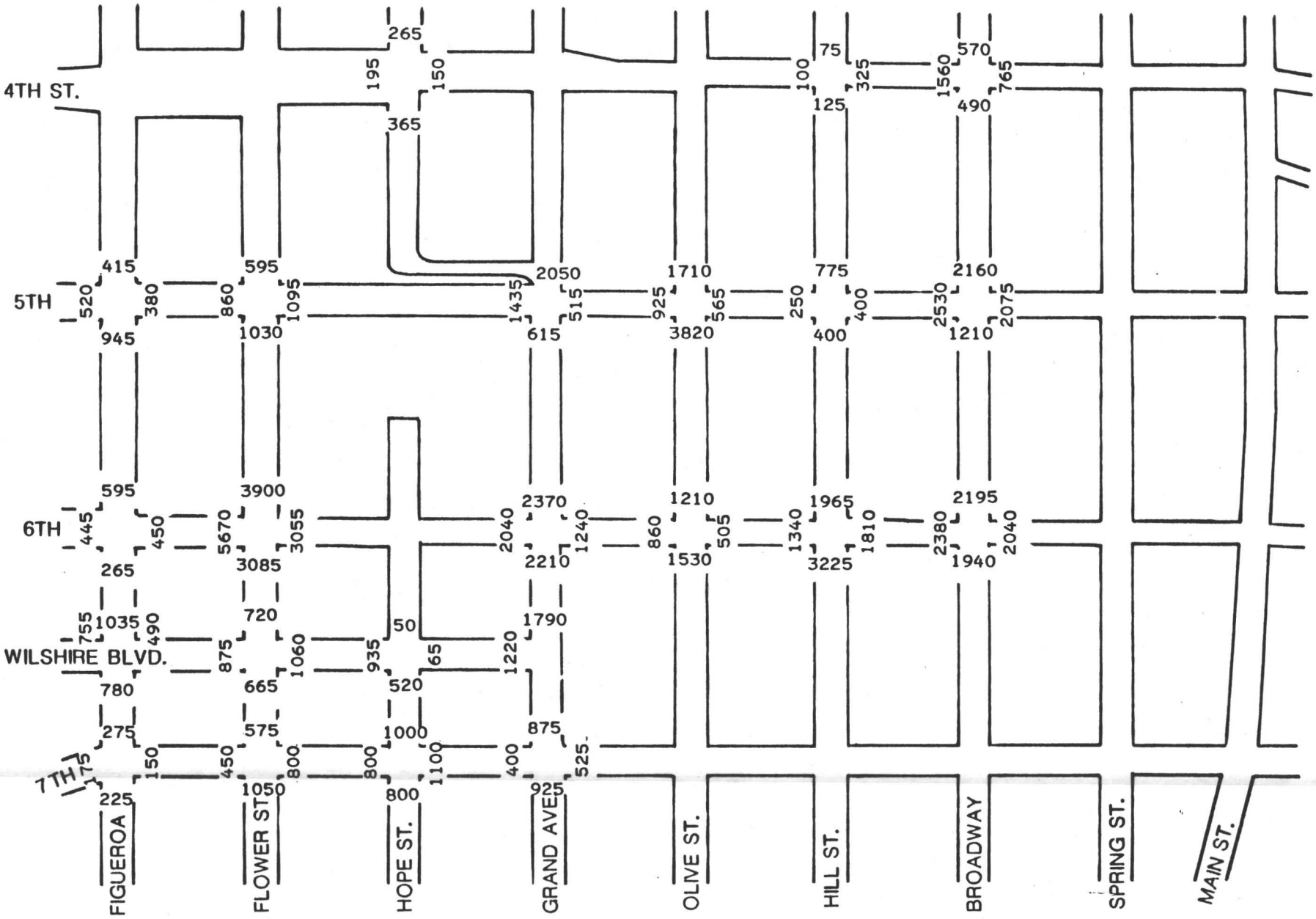
FIGURE 7A

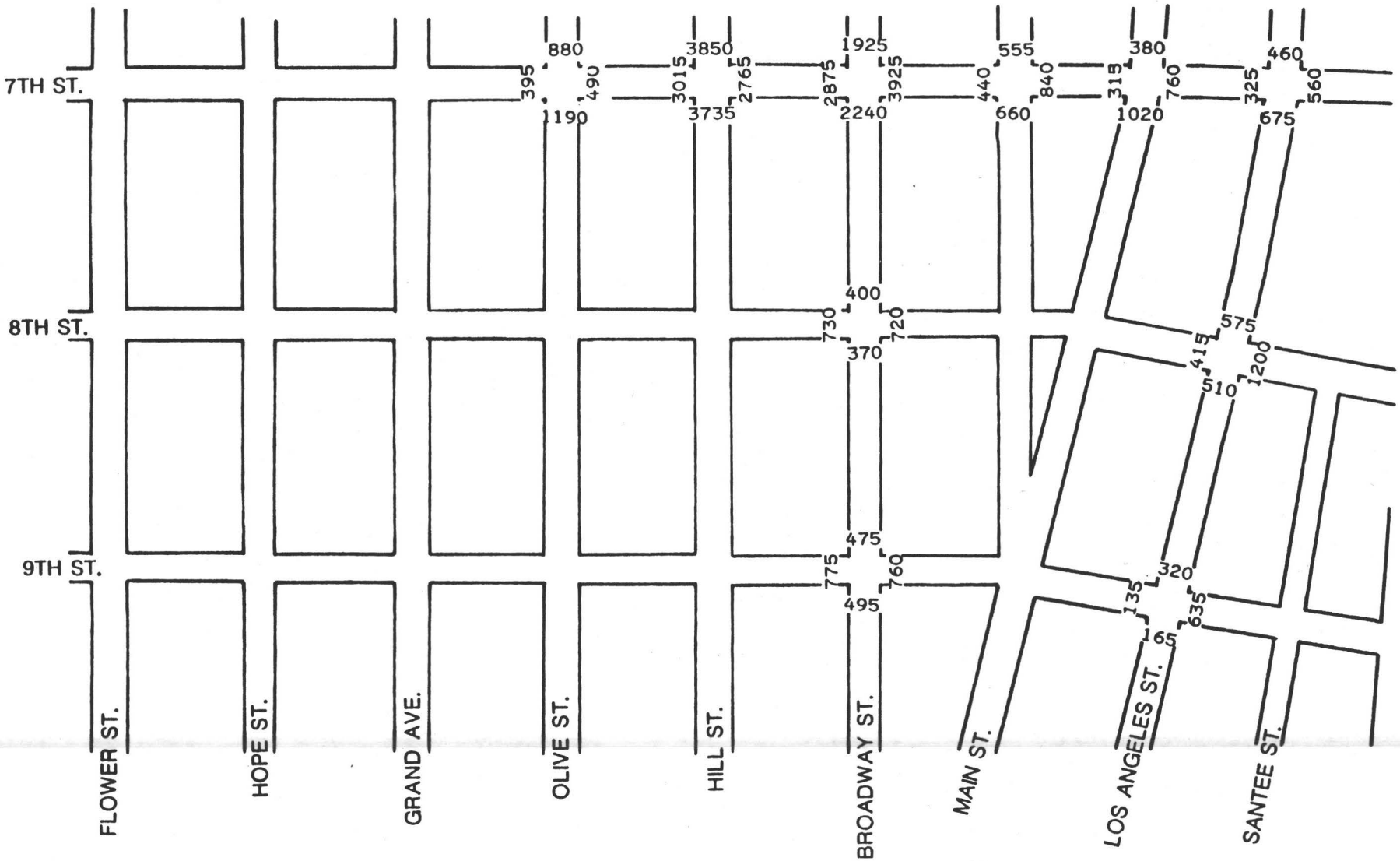


EXISTING MIDDAY PEAK HOUR CROSSWALK PEDESTRIAN VOLUMES

BARTON ASCHMAN ASSOCIATES, INC.

LEGEND: * CONSTRUCTION

FIGURE 7B



EXISTING MIDDAY PEAK HOUR CROSSWALK PEDESTRIAN VOLUMES

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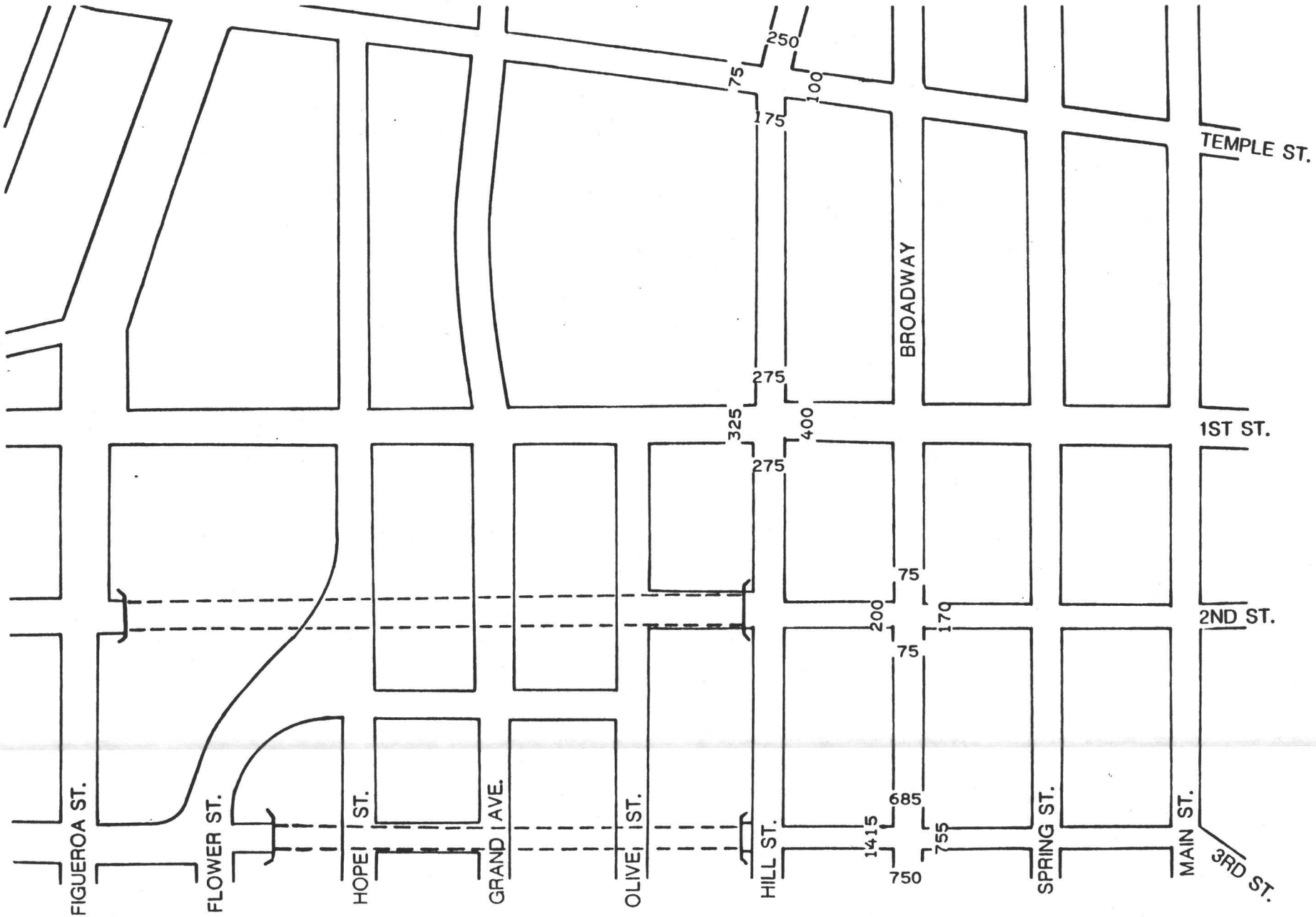
FIGURE 7C



EXISTING P.M. PEAK HOUR CROSSWALK PEDESTRIAN VOLUMES

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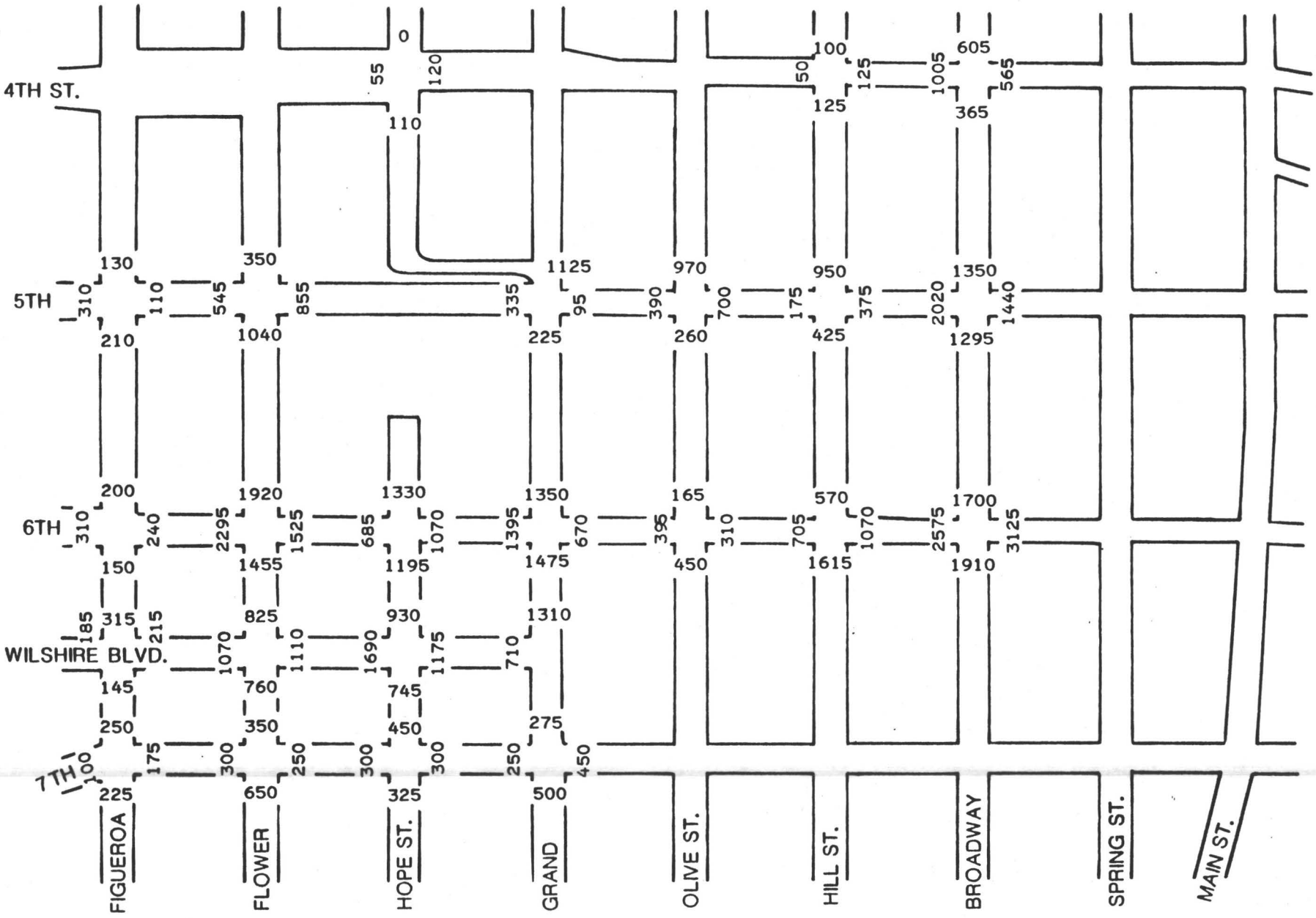
FIGURE 8A



EXISTING P.M. PEAK HOUR CROSSWALK PEDESTRIAN VOLUMES

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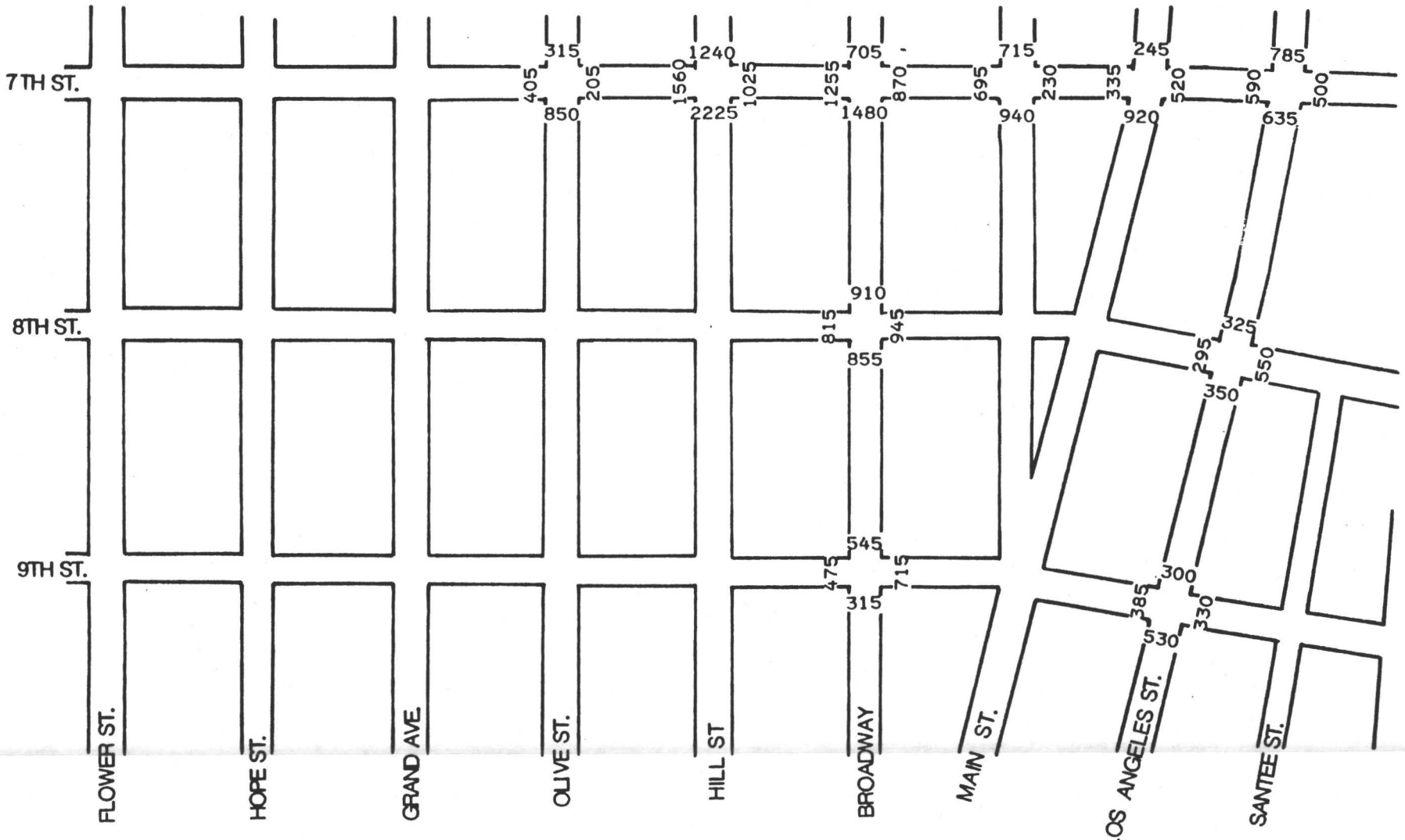
FIGURE 8B



EXISTING P.M. PEAK HOUR CROSSWALK PEDESTRIAN VOLUMES

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FIGURE 8C

The adjusted 15-minute volumes were used to determine the quality of flow at each crosswalk. Table 2 lists the volume and the quality of flow descriptions for crosswalks.

The results of the existing crosswalk quality-of-flow analyses for both the midday and PM peak hours are shown in Figures 9A - 9D and 10A - 10D, respectively.

The highest existing midday peak-hour crosswalk pedestrian volume is experienced on the crosswalk of the west approach at the intersection of Sixth Street and Flower Street. At this location, the pedestrian volume is approximately 5,670 pedestrians per hour (Figure 7B), and the quality of flow is crowded (Figure 9B). The lowest crosswalk volume occurs on the north approach at the intersection of Fourth and Hill Streets. At this location, the existing midday pedestrian volume is 75 (Figure 7B) with a quality of flow that is open (Figure 9B). As at the midblock locations, the northern part of the CBD generally has open or unimpeded conditions. Along parts of Broadway and much of Sixth Street, conditions tend to be impeded or constrained. Certain crosswalks along the Seventh Street corridor also exhibit impeded or constrained conditions.

During the PM peak hour, the highest existing crosswalk pedestrian volume occurs on the east approach at the intersection of Sixth Street and Broadway Street. The pedestrian flow is 3,125 pedestrians per hour (Figure 8B), and the quality of flow is constrained (Figure 10B). The lowest existing crosswalk volume is 75 pedestrians per hour, which occurs on the east approach at the intersection of Temple Street/Hill Street and on the north approach at the intersection of Second Street and Broadway (Figure 8A). The quality of flow at both of these locations is open (Figure 10A). Overall, conditions during the PM peak hour are improved over the midday situation. Only two

TABLE 2

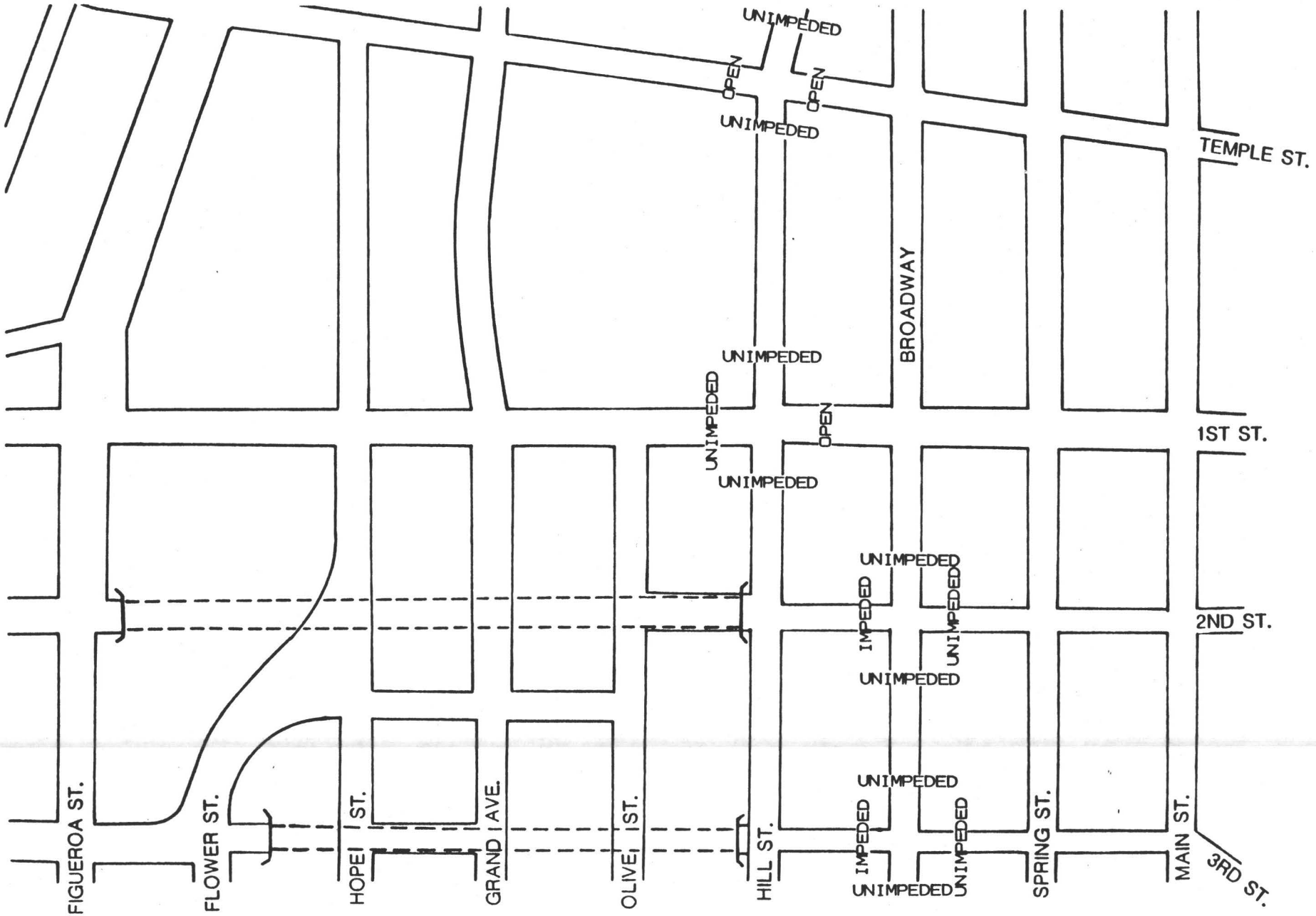
VOLUME AND QUALITY OF FLOW DESCRIPTION FOR CROSSWALKS[1]

Volume[2]	Quality of Flow Description
0 - 150	Open
150 - 600	Unimpeded
600 - 1800	Impeded
1800 - 3000	Constrained
3000 - 4200	Crowded
4200 - 5400	Congested
5400 - 7500	Jammed
Over 7500	N/A

NOTES:

(1) Information obtained from Pedestrian Studies of Metro Rail Areas, Wilbur Smith and Associates, September, 1984.

(2) Adjusted two-direction volume for peak 15-minute period for 20-foot effective crosswalk width. The peak 15-minute volume was derived from the hourly volume at each crosswalk.



EXISTING MIDDAY PEAK HOUR CROSSWALK PEDESTRIAN QUALITY OF FLOW

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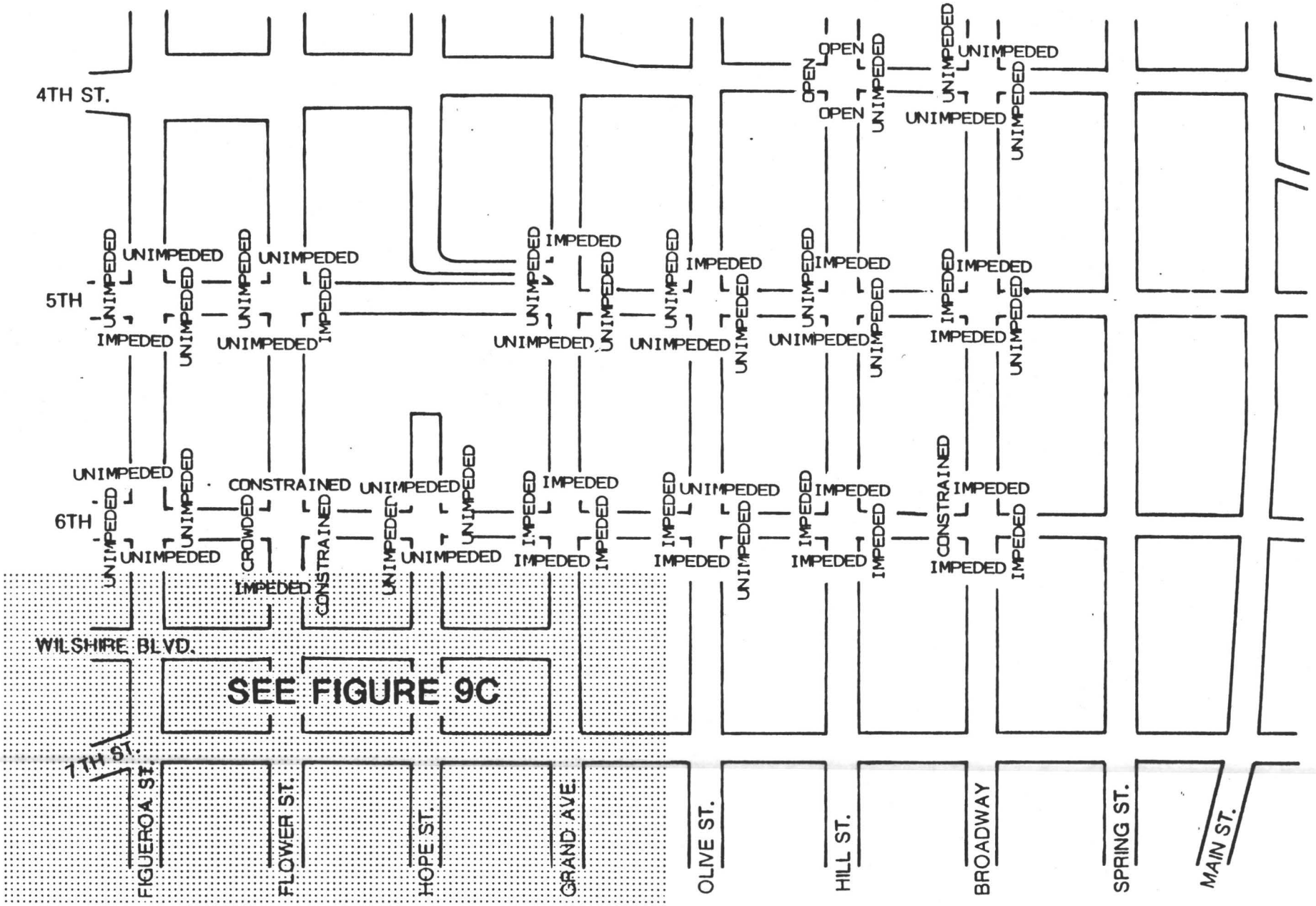
FIGURE 9A

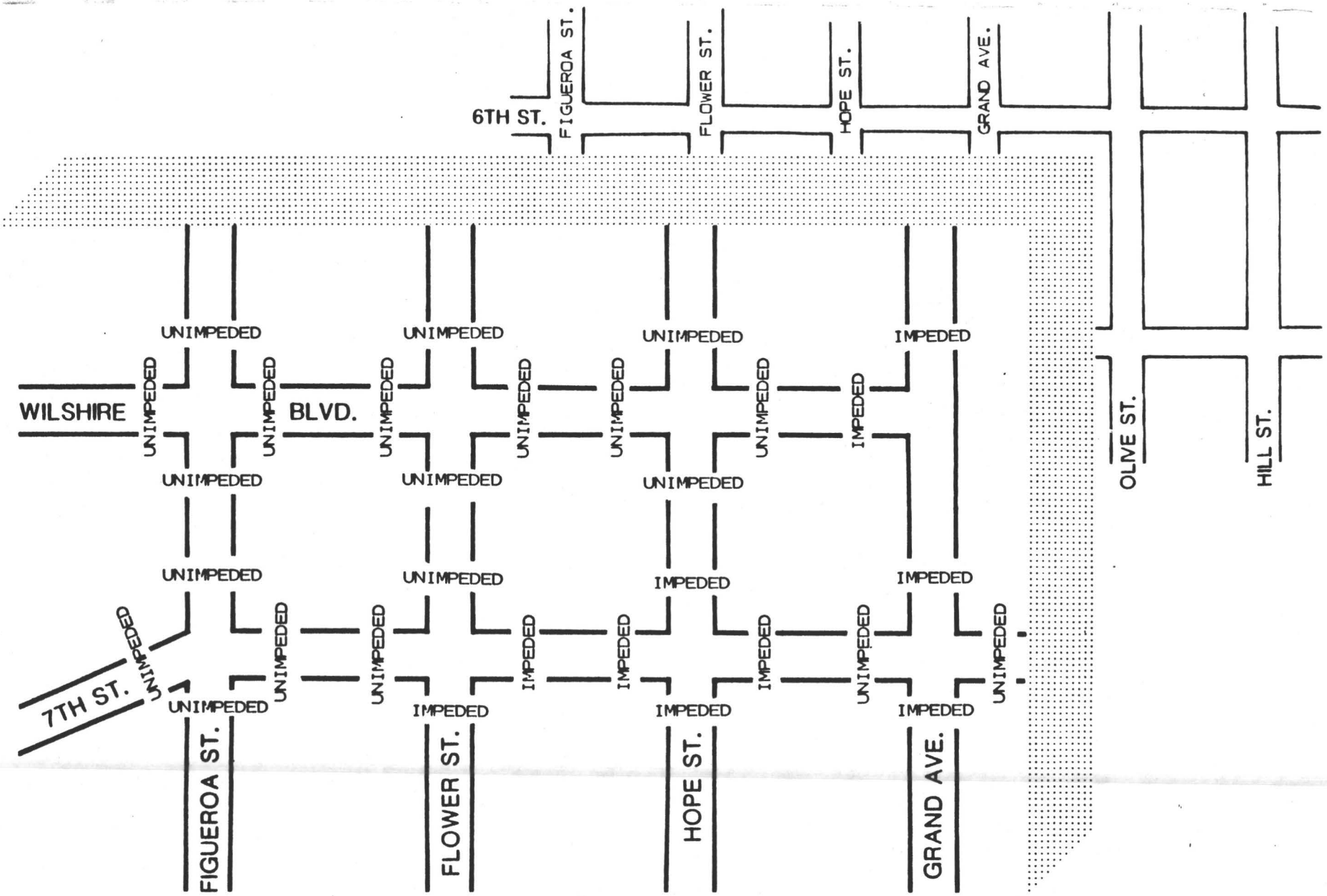


EXISTING MIDDAY PEAK HOUR CROSSWALK PEDESTRIAN QUALITY OF FLOW

BARTON ASCHMAN ASSOCIATES, INC.

LEGEND: * CONSTRUCTION

FIGURE 9B

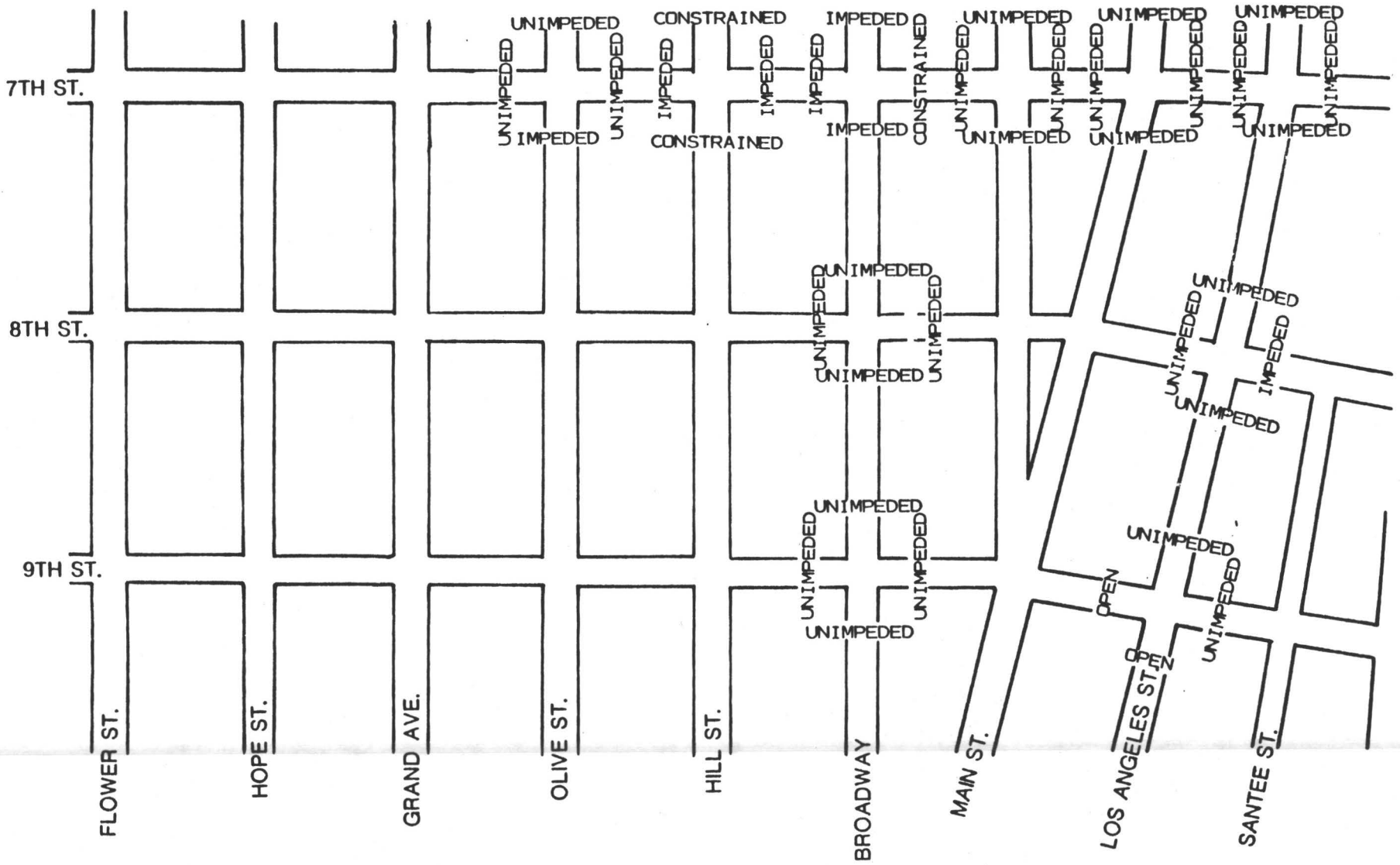


EXISTING MIDDAY PEAK HOUR CROSSWALK PEDESTRIAN QUALITY OF FLOW

BARTON ASCHMAN ASSOCIATES, INC.

LEGEND: * CONSTRUCTION

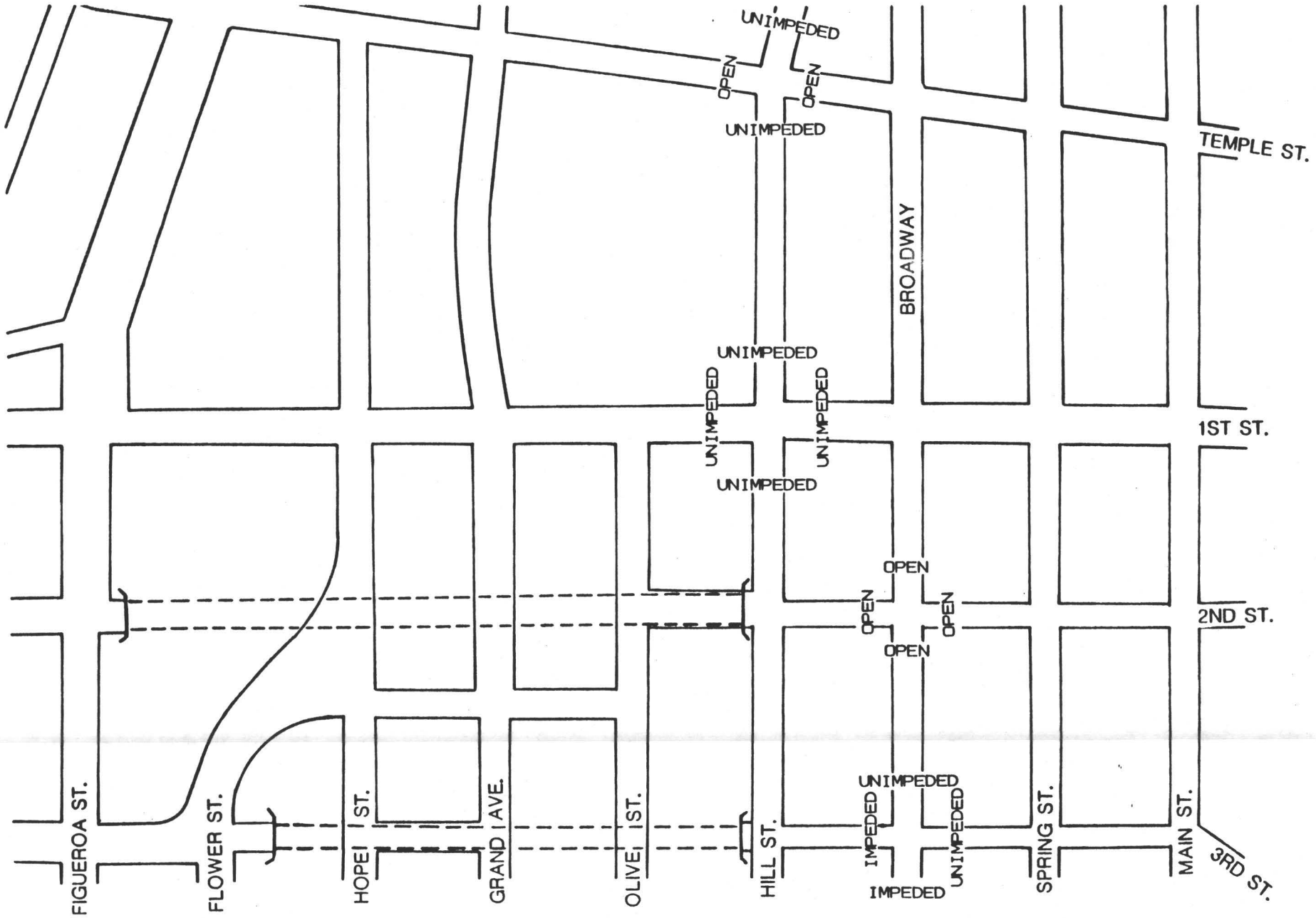
FIGURE 9C



EXISTING MIDDAY PEAK HOUR CROSSWALK PEDESTRIAN QUALITY OF FLOW

BARTON ASCHMAN ASSOCIATES, INC

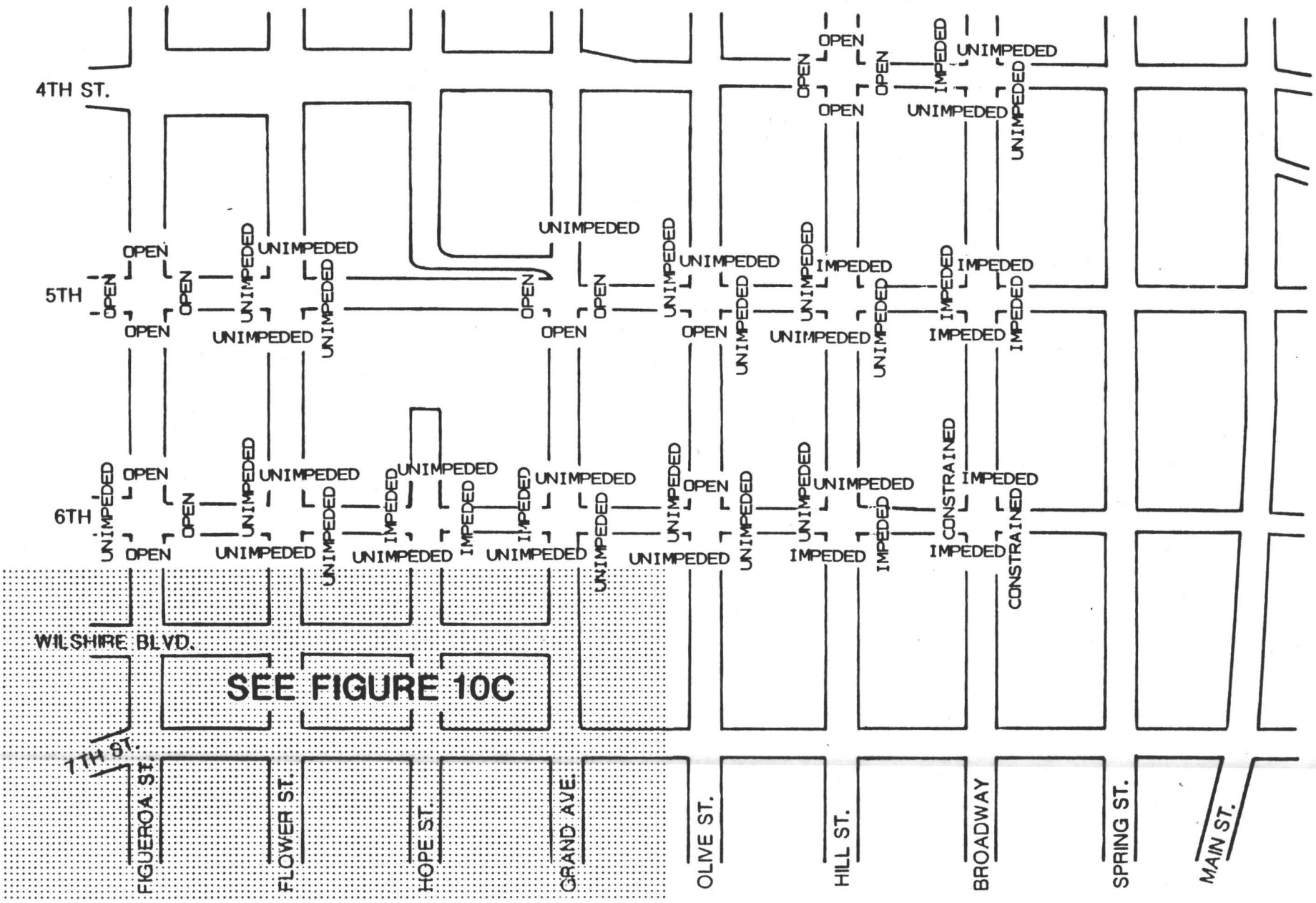
FIGURE 9D



EXISTING P.M. PEAK HOUR CROSSWALK PEDESTRIAN QUALITY OF FLOW

BARTON ASCHMAN ASSOCIATES, INC.

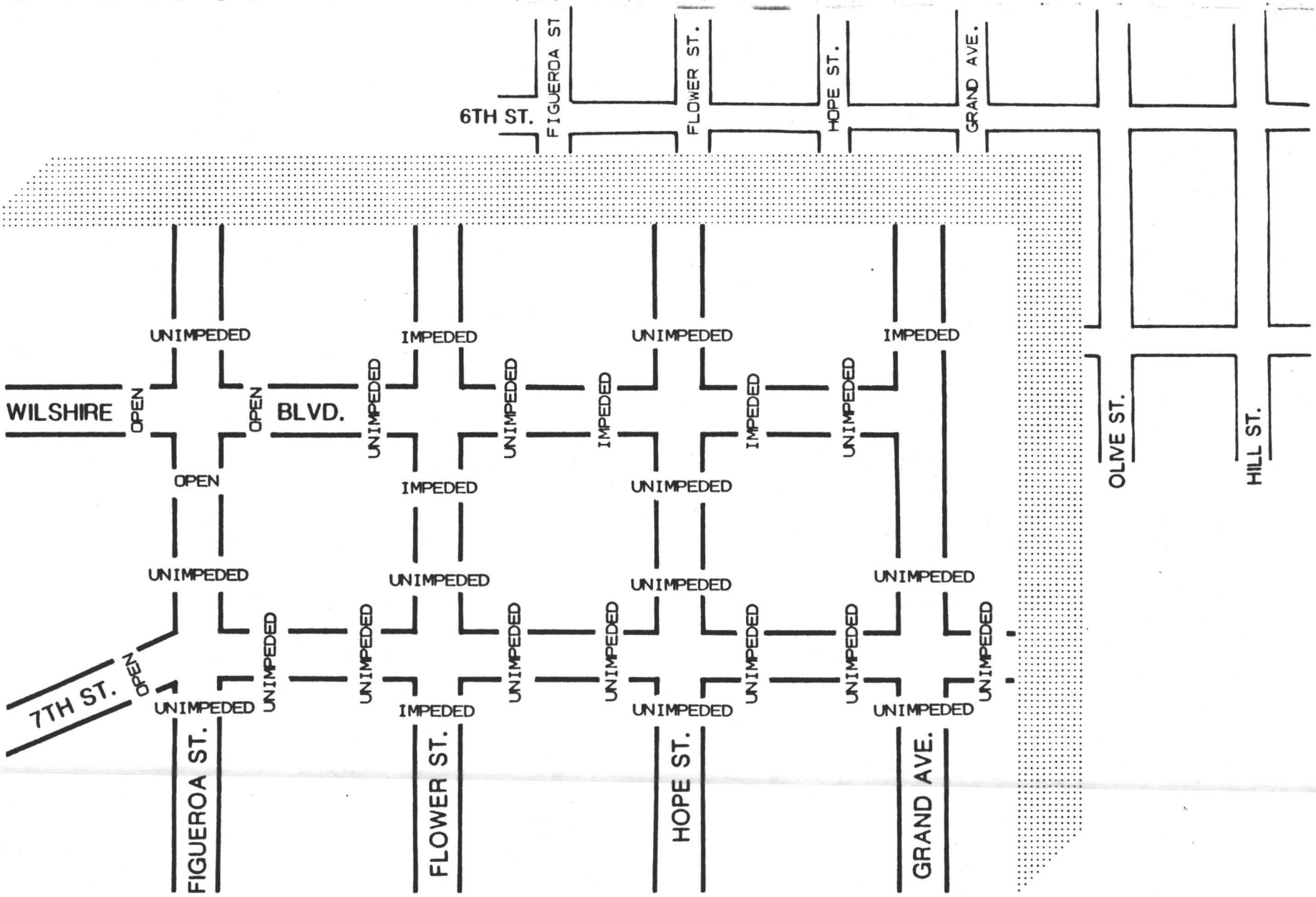
FIGURE 10A



EXISTING P.M. PEAK HOUR CROSSWALK PEDESTRIAN QUALITY OF FLOW

BARTON ASCHMAN ASSOCIATES INC.

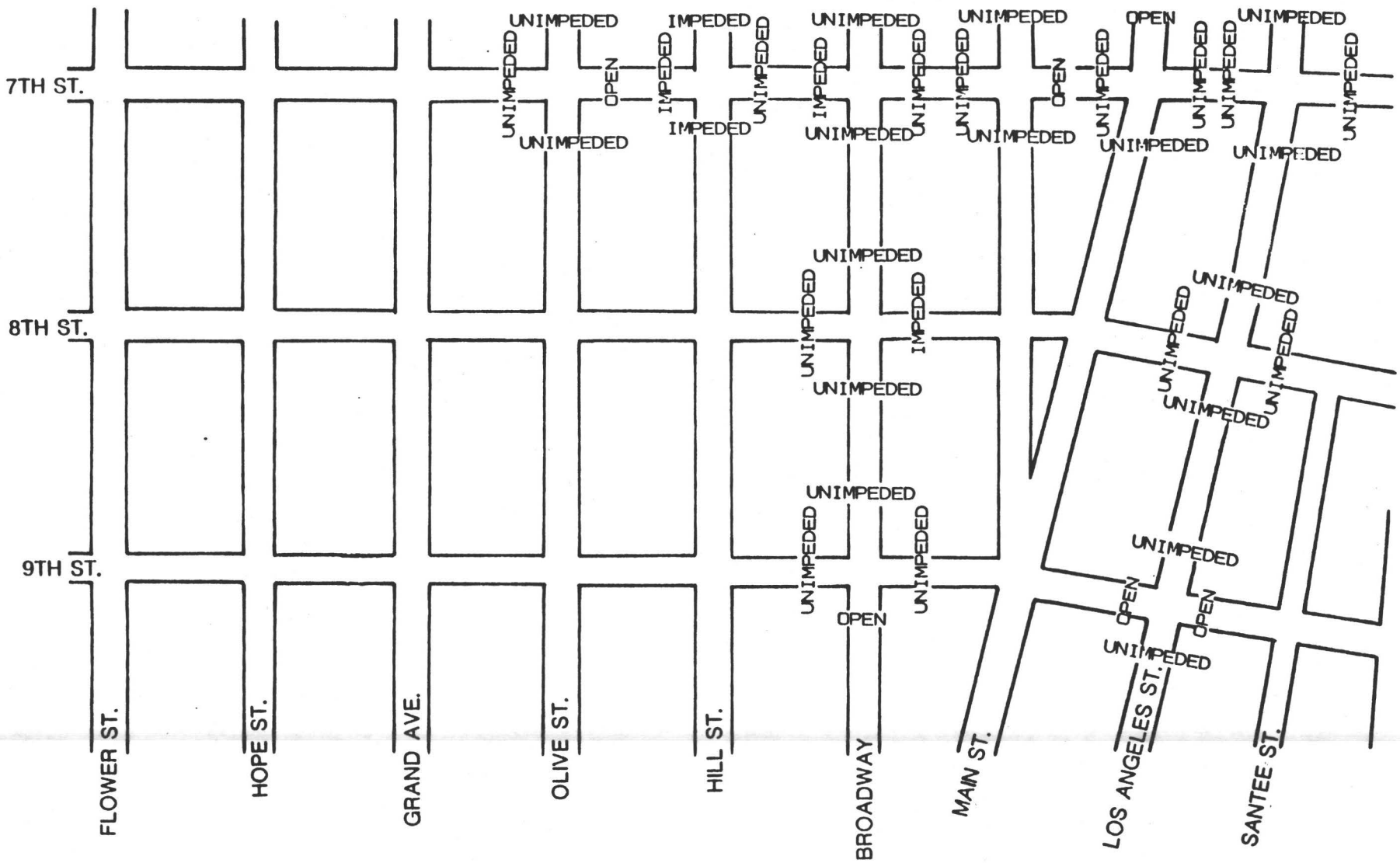
FIGURE 10B



EXISTING P.M. PEAK HOUR CROSSWALK PEDESTRIAN QUALITY OF FLOW

BARTON ASCHMAN ASSOCIATES, INC.

FIGURE 10C



EXISTING P.M. PEAK HOUR CROSSWALK PEDESTRIAN QUALITY OF FLOW

BARTON ASCHMAN ASSOCIATES, INC.

FIGURE 10D

crosswalks have a quality of flow worse than impeded. Both of those are constrained.

3.

PEDESTRIAN SURVEY

A pedestrian sidewalk interview was conducted by Wilbur Smith and Associates in June, 1984. Pedestrians were randomly selected to participate in the sidewalk survey. The survey was conducted within the Metro Rail station areas during both the midday and evening peak hours. The purpose of these interviews was to collect data concerning pedestrian use of downtown, as well as their attitude toward the pedestrian environment in downtown Los Angeles.

The results of this survey were obtained from the Pedestrian Studies of Metro Rail Station Areas report by Wilbur Smith and Associates and are summarized in Appendix C. The survey procedures and results, taken directly from the Wilbur Smith and Associates report, are described below.

PEDESTRIAN INTERVIEW PROCEDURES

A blank interview form used by the interviewer is shown in Appendix A. The interviewers recorded the approximate location of the interview and noted the direction of travel of the person interviewed. In some cases, when pedestrians being interviewed were not able to respond to the question, interviewers offered several possible answers or "prompts." For example, on question 7, "What do you find pleasant about this walking trip?," interviewers prompted those pedestrians who could not think of a response with such possible answers as "weather," "landscaping," "sidewalk activity," and "shop windows" in order to stimulate a response. These prompts were not felt to have biased the response in any particular direction. Multiple responses were accepted for questions 7 and 8, so totals may add up to more than 100 percent. Results of the pedestrian interviews are shown in Appendix A. Responses to each question are summarized below.

MODE OF TRANSPORTATION TO DOWNTOWN

Responses to question 1 indicate that transit is the most common method of getting downtown among those pedestrians interviewed in the Hill Street and Seventh Street Station areas, while auto use is more common among those at the Civic Center Station area. This difference may be related to the higher parking costs at the Seventh Street and Hill Street Station areas, the lower income level among those at the Hill Street area (and thus their higher dependency on transit) and the low parking costs experienced by County employees in the Civic Center Station area.

PURPOSE FOR COMING DOWNTOWN

Responses to question 2 indicate that while employment and personal business (70 percent and 27 percent) account for virtually all the reasons for being downtown among those interviewed at the Civic Center Station area, shopping activities attracted a considerable number of pedestrians to the Hill Street and Seventh Street Station areas (14 percent and 18 percent, respectively). The Hill Street and Seventh Street areas have a more diverse mixture of activities taking place within them than does the Civic Center Station area. On Saturday, shopping attracts the majority of people downtown, although many also come downtown to make bus transfers.

PURPOSE OF WALKING TRIP

Shopping and eating walking trips were more common in the Hill Street and Seventh Street Station areas than in the Civic Center area. While no one interviewed in the Civic Center Station area identified shopping as the main purpose of their walking trip, 19 percent of the Hill Street area and 20 percent of the Seventh Street area people did so. Seventeen percent of the Seventh Street area pedestrians identified eating as their major trip purpose, while 8 percent of Hill Street area people did so and only 3 percent of the Civic Center area group were going to or from eating places. Again, the Seventh Street and Hill Street Station areas appear to be more diverse in the type of activities present.

REASONS FOR SELECTING THIS ROUTE

The overwhelming response to the question "Why did you choose to walk along this street?" was that it was the shortest route. The most common alternate weekday responses related to "aspects of interest" along the route (6 per-

cent of the responses in the Civic Center area and 5 percent at Seventh Street), "safest" (5 percent in the Seventh Street area), and "least crowded" (5 percent in the Hill Street area). These responses reflect a basic pedestrian behavior pattern of selecting the shortest route possible. They also reflect an interest in street activity, safety and variety.

PLEASANT ASPECTS OF PEDESTRIAN ENVIRONMENT

"Landscaping" (13 percent), "diversity" (10 percent), and "appearance" (9 percent) were among the most frequently mentioned pleasant aspects of the pedestrian environment in the Civic Center Station area, while "shop windows" (10 percent) was a fairly frequent response at the Hill Street area. In both of these areas, however, "nothing" (31 percent and 46 percent, respectively) was the most common response. Positive responses in the Seventh Street area included "weather" (36 percent), "sidewalk activity" (14 percent), "shop windows" (12 percent), "fresh air" (11 percent), and "landscaping" (10 percent). Only 5 percent of those interviewed in the Seventh Street Station area replied that they didn't like anything about downtown. It should be pointed out that the weather was considerably brighter on the day on which the Seventh Street interviews were conducted. Among Saturday pedestrians at the Hill Street and Seventh Street Station areas, "shop windows" and "sidewalk activity" were frequently mentioned, reflecting the recreational nature of these persons' activities.

UNPLEASANT ASPECTS OF PEDESTRIAN ENVIRONMENT

At the Civic Center Station area, the most frequently mentioned unpleasant characteristics of the pedestrian environment were "traffic," (37 percent), "air pollution" and "exhaust" (28 percent), "too crowded" (24 percent), "bums" or "vagrants" (18 percent), and "noise" (13 percent). At the Hill

Street area, "bad appearance" was the most frequently mentioned response (41 percent), followed by "too crowded" and "bums" (28 percent), "air pollution" (26 percent), and "traffic" (15 percent). At the Seventh Street Station area, leading responses were "bad appearance" (26 percent), "traffic" (20 percent), "too crowded" (19 percent), and "noise" (15 percent).

The last two questions are best evaluated together. Pedestrians interviewed in the Seventh Street Station area seemed to have more positive feeling toward downtown than did pedestrians in the other two areas. Undesirable persons or "bums" were mentioned frequently in the Civic Center and Hill Street areas as unpleasant aspects of the walking trips. Dirty appearance was mentioned much more frequently at the Hill Street area than at the other two areas. Traffic, air pollution, and buses were frequently mentioned as objectionable elements to pedestrians in the Civic Center area, probably due to the large number of buses there. It also appears that people in the Civic Center area are more sensitive to traffic and buses than people in other station areas. This may be due to narrower sidewalks, faster vehicular speeds, and heavy cross-street traffic flows there. It is also interesting to note that "unsafe from crime" was mentioned at approximately the same rate at all three station areas, despite varying frequencies of complaints of undesirable people or "bums."

4.

FUTURE PEDESTRIAN CONDITIONS

A forecast of the future development planned for downtown Los Angeles has been completed for the Community Redevelopment Agency. The "Downtown Los Angeles Development Forecast" completed by Economics Research Associates lists over 70 development projects that are expected to occur in the next five to ten years. This chapter evaluates the impacts that the pedestrian traffic generated by these future developments would have on the existing pedestrian circulation patterns.

PEDESTRIAN TRIP GENERATION RATES

Pedestrian trip generation rates were developed specifically for downtown Los Angeles in a recent report, Pedestrian Studies of Metro Rail Station Areas, by Wilbur Smith and Associates. Certain of those rates, however, were inconsistent with previous pedestrian trip generation research. For example, the office and retail rates developed by WSA were significantly lower than would normally be expected. Also, the residential rates are

based on surveys at Angelus Plaza, a senior citizen housing development. It is expected that elderly persons might be less inclined to take pedestrian trips than the general population. For those reasons, the pedestrian trip generation rates were updated by Barton-Aschman Associates, Inc. for the following land uses:

- Office
- Retail
- Residential

A trip generation rate is defined as the number of trips generated by a land use in relation to some parameter of that land use. In order to determine the pedestrian trip generation rates, pedestrian counts were conducted at the entrances of the following locations during the midday peak period and the evening peak period:

- First Interstate Bank (corner of Hope Street and Wilshire Boulevard)
- Daisen Gifts(1)
- Fowler Brothers Books(1)
- Roosevelt Building Pharmacy(1)
- See's Candies(1)
- Berkel's Luggage(1)
- Robinson's Department Store (south side of Seventh Street between Hope Street and Grand Avenue)
- Bunker Hill Towers
- Hilton Hotel

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(1) These retail stores are located in the Roosevelt Building on the north-east corner of Seventh Street and Flower Street.

The pedestrian volumes were then related to the size of the buildings in terms of occupied square feet, occupied hotel rooms, or occupied residential units. This resulted in pedestrian trip rates per 1,000 square feet of building area, per hotel room, or per dwelling unit.

Table 3 illustrates the midday and evening trip generation rates developed for downtown Los Angeles and used in this study.

TRIP GENERATION

Through the use of the pedestrian trip rates developed for downtown Los Angeles, the amount of pedestrian traffic to be generated by the future developments was estimated.

The "Downtown Los Angeles Development Forecast" was split into two time frames. The first time frame, 1983 - 1989, includes some projects that are currently under construction or even completed. For the purpose of this study, projects that have been completed were excluded from the analysis to reflect a revised development forecast for 1985 - 1989. In this way, the possibility of double-counting pedestrians under both existing and future conditions is eliminated. The future project locations are illustrated in Figure 11.

The pedestrian trip generation rates developed above were applied to these future projects. Table 4 shows the pedestrian trips generated by these projects during the midday peak hour. A total of almost 70,000 pedestrian trips will be generated by the new buildings during this time period. The trips will be approximately evenly split between the inbound and outbound directions. The pedestrian trips generated by these projects in the evening peak hour are shown in Table 5. Approximately 36,000 new pedestrian

TABLE 3

PEDESTRIAN TRIP GENERATION RATES
DEVELOPED FOR DOWNTOWN LOS ANGELES

Land Use	Midday Peak Hour Trip Rates[1]			P.M. Peak Hour Trip Rates		
	In	Out	Total	In	Out	Total
Office	1.28	0.98	2.26	0.17	1.13	1.30
Retail[2] (Under 200,000 S.F.)	22.50	22.50	45.00	8.60	8.90	17.50
Retail - Department Store (Over 200,000 S.F.)	1.71	1.60	3.31	0.55	0.51	1.06
Residential	0.16	0.17	0.33	0.21	0.12	0.33
Hotel	1.01	1.02	2.03	1.01	1.02	2.03

NOTES:

(1) Office, retail, and residential trip rates developed by Barton-Aschman Associates, Inc. specifically for downtown Los Angeles. Hotel trip rates used were obtained from Pedestrian Studies of Metro Rail Station Areas, Wilbur Smith and Associates, September 1984.

(2) The small retail trip rates listed here are composites based on the results of actual surveys in downtown Los Angeles and research by Pushkarev and Zupan in Urban Space for Pedestrians.

1990 DEVELOPMENT FORECAST

BARTON ASCHMAN ASSOCIATES, INC.

FIGURE 11

TABLE 4

TRIP GENERATION
MIDDAY PEAK HOUR
DEVELOPMENT FORECASTS
1985 - 1989

Project Number	Project Name	Land-Use	Size (S.F.)	Midday Pedestrian Trip Rates(1) In	Out	Total	Midday Pedestrian Trips In	Out	Total
1	Figueroa Plaza I	Office	300,000	1.28	0.98	2.26	385	295	680
4	Cal Plaza I-A	Office	1,000,000	1.28	0.98	2.26	1,280	980	2,260
		Retail	30,000	22.5	22.5	45.0	675	675	1,350
5	Cal Plaza II-A	Office	1,500,000	1.28	0.98	2.26	1,920	1,470	3,390
		Retail	50,000	22.5	22.5	45.0	1,125	1,125	2,250
6	"Central Library I"	Office	1,000,000	1.28	0.98	2.26	1,280	980	2,260
		Retail	10,000	22.5	22.5	45.0	225	225	450
7	State Office Building	Office	825,000	1.28	0.98	2.26	1,055	810	1,865
		Retail	13,000	22.5	22.5	45.0	295	295	590
9	Beaudry II	Office	775,000	1.28	0.98	2.26	990	760	1,750
10	Citicorp I	Office	900,000	1.28	0.98	2.26	1,150	880	2,030
		Retail(2)	273,000	1.71	1.60	3.31	465	435	900
		Retail	90,000	22.50	22.50	45.0	2,025	2,025	4,050
11	Mitsui	Office	845,000	1.28	0.98	2.26	1,080	830	1,910
12	Reliance I	Office	365,000	1.28	0.98	2.26	465	360	825
13	Citicorp II	Office	900,000	1.28	0.98	2.26	1,150	880	2,030

TABLE 4 (Continued)

TRIP GENERATION
MIDDAY PEAK HOUR
DEVELOPMENT FORECASTS
1985 - 1989

Project Number	Project Name	Land-Use	Size (S.F.)	Midday Pedestrian Trip Rates			Midday Pedestrian Trips		
				In	Out	Total	In	Out	Total
14	International Tower	Office	350,000	1.28	0.98	2.26	450	345	795
		Retail	40,000	22.50	22.50	45.0	900	900	1,800
15	New Otani Expansion	Hotel	200 Rooms	1.01	1.02	2.03	200	200	400
16	Best Western	Hotel	100 Rooms	1.01	1.02	2.03	100	100	200
17	Cal Plaza I-B	Hotel	450 Rooms	1.01	1.02	2.03	455	460	915
		Retail	20,000	22.50	22.50	45.0	450	450	900
19	Embassy	Hotel	250 Units	1.01	1.02	2.03	255	255	510
21	Bunker Hill "A"	Residential	490 Units	0.16	0.17	0.33	80	85	165
22	Bunker Hill "L" and "M"	Residential	560 Units	0.16	0.17	0.33	90	95	185
		Retail	80,000	22.50	22.50	45.0	1,800	1,800	3,600
23	Cal Plaza II-B	Residential	250 Units	0.16	0.17	0.33	40	45	85
		Retail	15,000	22.50	22.50	45.0	340	340	680
24	Tokyo Villa	Residential	165 Units	0.16	0.17	0.33	25	30	55
25	Little Tokyo	Residential	200 Units	0.16	0.17	0.33	30	35	65
26	First Street North	Residential	135 Units	0.16	0.17	0.33	20	25	45

TABLE 4 (Continued)

TRIP GENERATION
MIDDAY PEAK HOUR
DEVELOPMENT FORECASTS
1985 - 1989

Project Number	Project Name	Land-Use	Size (S.F.)	Midday Pedestrian Trip Rates			Midday Pedestrian Trips		
				In	Out	Total	In	Out	Total
27	First Street East	Residential	200 Units	0.16	0.17	0.33	30	35	65
28	Premiere Towers	Residential	120 Units	0.16	0.17	0.33	20	20	40
		Retail	21,000 S.F.	22.50	22.50	45.0	475	475	950
29	Skyline - II	Residential	210 Units	0.16	0.17	0.33	35	35	70
		Retail	15,000	22.50	22.50	45.0	340	340	680
30	Parkside	Retail	30,000	22.50	22.50	45.0	340	340	680
31	Ninth Street	Residential	200 Units	0.16	0.17	0.33	30	35	65
32	Commercial Exchange	Residential	100 Units	0.16	0.17	0.33	15	20	35
33	Stilwell Block	Residential	350 Units	0.16	0.17	0.33	55	60	115
34	Little Tokyo	Retail	65,000	22.50	22.50	45.0	1,465	1,465	2,930
35	Lumer	Retail	50,000	22.50	22.50	45.0	1,125	1,125	2,250
36	Fourth & Broadway	Retail	50,000	22.50	22.50	45.0	1,125	1,125	2,250
46	Grand Financial	Office	400,000	1.28	0.98	2.26	510	395	905
		Retail	10,000	22.50	22.50	45.0	225	225	450

TABLE 4 (Continued)

TRIP GENERATION
MIDDAY PEAK HOUR
DEVELOPMENT FORECASTS
1985 - 1989

Project Number	Project Name	Land-Use	Size (S.F.)	Midday Pedestrian Trip Rates			Midday Pedestrian Trips		
				In	Out	Total	In	Out	Total
47	Federal Reserve	Office	340,000	1.28	0.98	2.26	435	335	770
52	Pershing Square Center	Hotel	500 Rooms	1.01	1.02	2.03	505	510	1,015
55	Ninth & Figueroa	Hotel	500 Units	1.01	1.02	2.03	505	510	1,015
		Retail	10,000	22.50	22.50	45.00	225	225	450
56	Convention Center	Hotel	650 Units	1.01	1.02	2.03	655	665	1,320
		Retail	50,000	22.50	22.50	45.0	1,125	1,125	2,250
57	Cal Plaza III - B	Retail	10,000	22.50	22.50	45.0	225	225	450
		Residential	500 Units	0.16	0.17	0.33	80	85	165
58	Bunker Hill "W-2"	Residential	200 Units	0.16	0.17	0.33	30	35	65
59	First Street North	Residential	150 Units	0.16	0.17	0.33	25	25	50
60	First Street East	Residential	200 Units	0.16	0.17	0.33	30	35	65
61	Pershing Square Center	Residential	100 Units	0.16	0.17	0.33	15	20	25
62	Coast Federal	Residential	200 Units	0.16	0.17	0.33	30	35	65

TABLE 4 (Continued)

TRIP GENERATION
MIDDAY PEAK HOUR
DEVELOPMENT FORECASTS
1985 - 1989

Project Number	Project Name	Land-Use	Size (S.F.)	Midday Pedestrian Trip Rates			Midday Pedestrian Trips		
				In	Out	Total	In	Out	Total
63	Holiday Inn	Residential	200 Units	0.16	0.17	0.33	30	35	65
64	Marketplace	Residential	200 Units	0.16	0.17	0.33	30	35	65
65	Western Insurance	Residential	300 Units	0.16	0.17	0.33	50	50	100
66	Variety Arts	Residential	200 Units	0.16	0.17	0.33	30	35	65
		Retail	30,000	22.50	22.50	45.0	675	675	1,350
67	Gas Company	Residential	100 Units	0.16	0.17	0.33	15	20	35
68	Hope Street	Residential	700 Units	0.16	0.17	0.33	110	120	230
70	System Parking Site	Retail	100,000	22.50	22.50	45.00	2,250	2,250	4,500
71	Marketplace	Retail	50,000	22.50	22.50	45.00	1,125	1,125	2,250
72	"Central Library II"	Retail	10,000	22.50	22.50	45.0	225	225	450
		Office	1,000,000	1.28	.98	2.26	1,280	980	2,260

(1) Office, retail, and residential trip rates developed by Barton-Aschman Associates, Inc. specifically for downtown Los Angeles. Hotel rates are based on Pedestrian Studies of Metro Rail Station Areas, Wilbur Smith and Associates, September, 1984.

(2) Department store retail rates used.0

TABLE 5

TRIP GENERATION
P.M. PEAK HOUR
DEVELOPMENT FORECASTS
1985 - 1989

Project Number	Project Name	Land-Use	Size (S.F.)	PM Peak Pedestrian Trip Rates(1) In	Out	Total	PM Peak Pedestrian Trips In	Out	Total
1	Figueroa Plaza I	Office	300,000	0.17	1.13	1.30	50	340	390
4	Cal Plaza I-A	Office	1,000,000	0.17	1.13	1.30	170	1,130	1,300
		Retail	30,000	8.60	8.90	17.50	260	265	525
5	Cal Plaza II-A	Office	1,500,000	0.17	1.13	1.30	255	1,695	1,950
		Retail	50,000	8.60	8.90	17.50	430	445	875
6	"Central Library I"	Office	1,000,000	0.17	1.13	1.30	170	1,130	1,300
		Retail	10,000	8.60	8.90	17.50	85	90	175
7	State Office Building	Office	825,000	0.17	1.13	1.30	140	930	1,070
		Retail	13,000	8.60	8.90	17.50	110	115	225
9	Beaudry II	Office	775,000	0.17	1.13	1.30	130	875	1,005
10	Citicorp I	Office	900,000	0.17	1.13	1.30	155	1,015	1,170
		Retail(2)	273,000	0.55	0.51	1.06	150	140	290
		Retail	90,000	8.60	8.90	17.50	775	800	1,575
11	Mitsui	Office	845,000	0.17	1.13	1.30	145	955	1,100
12	Reliance I	Office	365,000	0.17	1.13	1.30	60	415	475
13	Citicorp II	Office	900,000	0.17	1.13	1.30	155	1,015	1,170

TABLE 5 (Continued)

TRIP GENERATION
P.M. PEAK HOUR
DEVELOPMENT FORECASTS
1985 - 1989

Project Number	Project Name	Residential	Size (S.F.)	PM Peak Pedestrian Trip Rates			PM Peak Pedestrian Trips		
				In	Out	Total	In	Out	Total
14	International Tower	Office	350,000	0.17	1.13	1.30	60	395	455
		Retail	40,000	8.60	8.90	17.50	345	355	710
15	New Otani Expansion	Hotel	200 Rooms	1.01	1.02	2.03	200	205	405
16	Best Western	Hotel	100 Rooms	1.01	1.02	2.03	100	100	200
17	Cal Plaza I-B	Hotel	450 Rooms	1.01	1.02	2.03	455	460	915
		Retail	20,000	8.60	8.90	17.50	170	180	350
19	Embassy	Hotel	250 Units	1.01	1.02	2.03	255	255	510
21	Bunker Hill "A"	Residential	490 Units	0.21	0.12	0.33	105	60	165
22	Bunker Hill "L" and "M"	Residential	560 Units	0.21	0.12	0.33	120	65	185
		Retail	80,000	8.60	8.90	17.50	690	710	1,400
23	Cal Plaza II-B	Residential	250 Units	0.21	0.12	0.33	55	30	85
		Retail	15,000	8.60	8.90	17.50	130	135	265
24	Tokyo Villa	Residential	165 Units	0.21	0.12	0.33	35	20	55
25	Little Tokyo	Residential	200 Units	0.21	0.12	0.33	40	25	65
26	First Street North	Residential	135 Units	0.21	0.12	0.33	30	15	45

TABLE 5 (Continued)

TRIP GENERATION
P.M. PEAK HOUR
DEVELOPMENT FORECASTS
1985 - 1989

Project Number	Project Name	Land-Use	Size (S.F.)	PM Peak Pedestrian Trip Rates			PM Peak Pedestrian Trips		
				In	Out	Total	In	Out	Total
27	First Street East	Residential	200 Units	0.21	0.12	0.33	40	25	65
28	Premiere Towers	Residential	120 Units	0.21	0.12	0.33	25	15	40
		Retail	21,000 S.F.	8.60	8.90	17.50	180	185	365
29	Skyline - II	Residential	210 Units	0.21	0.12	0.33	45	25	70
		Retail	15,000	8.60	8.90	17.50	130	135	265
30	Parkside	Retail	30,000	8.60	8.90	17.50	260	265	525
31	Ninth Street	Residential	200 Units	0.21	0.12	0.33	40	25	65
32	Commercial Exchange	Residential	100 Units	0.21	0.12	0.33	20	15	35
33	Stilwell Block	Residential	350 Units	0.21	0.12	0.33	75	40	115
34	Little Tokyo	Retail	65,000	8.60	8.90	17.50	560	580	1,140
35	Lumer	Retail	50,000	8.60	8.90	17.50	430	445	875
36	Fourth & Broadway	Retail	50,000	8.60	8.90	17.50	430	445	875
46	Grand Financial	Office	400,000	0.17	1.13	1.30	70	450	520
	Retail		10,000	8.60	8.90	17.50	85	90	175

TABLE 5 (Continued)

TRIP GENERATION
P.M. PEAK HOUR
DEVELOPMENT FORECASTS
1985 - 1989

Project Number	Project Name	Land-Use	Size (S.F.)	PM Peak Pedestrian Trip Rates			PM Peak Pedestrian Trips		
				In	Out	Total	In	Out	Total
47	Federal Reserve	Office	340,000	0.17	1.13	1.30	60	385	445
52	Pershing Square Center	Hotel	500 Rooms	1.01	1.02	2.03	505	510	1,015
55	Ninth & Figueroa	Hotel	500 Units	1.01	1.02	2.03	505	510	1,015
		Retail	10,000	8.60	8.90	17.50	85	90	175
56	Convention Center	Hotel	650 Units	1.01	1.02	2.03	655	665	1,320
		Retail	50,000	8.60	8.90	17.50	430	445	875
57	Cal Plaza III - B	Retail	10,000	8.60	8.90	17.50	85	90	175
		Residential	500 Units						
58	Bunker Hill "W-2"	Residential	200 Units	0.21	0.12	0.33	40	25	65
59	First Street North	Residential	150 Units	0.21	0.12	0.33	30	20	50
60	First Street East	Residential	200 Units	0.21	0.12	0.33	40	25	65
61	Pershing Square Center	Residential	100 Units	0.21	0.12	0.33	20	15	35
62	Coast Federal	Residential	200 Units	0.21	0.12	0.33	40	25	65

TABLE 5 (Continued)

TRIP GENERATION
P.M. PEAK HOUR
DEVELOPMENT FORECASTS
1985 - 1989

Project Number	Project Name	Land-Use	Size (S.F.)	PM Peak Pedestrian Trip Rates			PM Peak Pedestrian Trips		
				In	Out	Total	In	Out	Total
63	Holiday Inn	Residential	200 Units	0.21	0.12	0.33	40	25	65
64	Marketplace	Residential	200 Units	0.21	0.12	0.33	40	25	65
65	Western Insurance	Residential	300 Units	0.21	0.12	0.33	65	35	100
66	Variety Arts	Residential	200 Units	0.21	0.12	0.33	40	25	65
		Retail	30,000	8.60	8.90	17.50	260	265	525
67	Gas Company	Residential	100 Units	0.21	0.12	0.33	20	15	35
68	Hope Street	Residential	700 Units	0.21	0.12	0.33	145	85	230
70	System Parking Site	Retail	100,000	8.60	8.90	17.50	860	890	1,750
71	Marketplace	Retail	50,000	8.60	8.90	17.50	430	445	875
72	"Central Library II"	Retail	10,000	8.60	8.90	17.50	85	90	175
		Office	1,000,000	0.17	1.13	1.30	170	1,130	1,300

(1) Office, retail, and residential trip rates developed by Barton-Aschman Associates, Inc. specifically for downtown Los Angeles. Hotel rates are based on Pedestrian Studies of Metro Rail Station Areas, Wilbur Smith and Associates, September, 1984.

(2) Department store retail rates used.

trips will occur during the PM peak hour. Almost 23,000 of those will be outbound, with the remaining 13,000 inbound.

The second time frame includes projects expected to be developed during the 1990 - 1995 time period. Figure 12 illustrates the locations of these projects.

The pedestrian trip generation rates were applied to these projects for both the midday peak hour and the PM peak hour. The number of pedestrian trips generated by these projects during the midday peak hour and the PM peak hour are shown in Tables 6 and 7, respectively. During the midday peak hour, just over 30,000 pedestrian trips will be generated (about 16,000 inbound and 14,000 outbound). In the PM peak hour, the total will be about 16,200 trips (4,600 inbound and 11,600 outbound).

FUTURE PEDESTRIAN TRIP DISTRIBUTION AND ASSIGNMENT

The distribution of trips to/from each project site was derived based largely on information concerning pedestrian behavior obtained from the pedestrian interview survey conducted by Wilbur Smith and Associates and discussed in Chapter 3.

The results of the pedestrian interview survey indicated that pedestrian trips are influenced by existing land uses and by trip purpose. The most common walking trip purpose was to shop or to eat (i.e., retail trips). In addition, most pedestrians selected the shortest route to their destination.

Based on this information, the pedestrian trips generated by future development were assigned to the sidewalk network based on the type of land

1995 DEVELOPMENT FORECAST

BARTON ASCHMAN ASSOCIATES INC

FIGURE 12

TABLE 6

TRIP GENERATION
MIDDAY PEAK HOUR
DEVELOPMENT FORECASTS
1990 - 1995

Project Number	Project Name	Land-Use	Size (S.F.)	Midday Pedestrian Trip Rates(1)			Midday Pedestrian Trips		
				In	Out	Total	In	Out	Total
2	One City Center	Office	600,000	1.28	0.98	2.26	770	590	1,360
		Retail	15,000	22.50	22.50	45.00	340	340	680
38	Bunker Hill "W-1"	Office	500,000	1.28	0.98	2.26	640	490	1,130
		Retail	50,000	22.50	22.50	45.0	1,125	1,125	2,250
39	Cal Plaza III - A	Office	1,100,000	1.28	0.98	2.26	1,410	1,080	2,490
		Retail	20,000	22.50	22.50	45.0	450	450	900
40	Pershing Square Center	Office	600,000	1.28	0.98	2.26	770	590	1,360
41	Jewelry Center II	Office	200,000	1.28	0.98	2.26	255	195	450
		Retail	20,000	22.50	22.50	45.0	450	450	900
42	Church of Open Door	Office	500,000	1.28	0.98	2.26	640	490	1,130
		Retail	10,000	22.50	22.50	45.0	225	225	450
43	Citicorp III	Office	900,000	1.28	0.98	2.26	1,155	880	2,035
44	Variety Arts	Office	500,000	1.28	0.98	2.26	640	490	1,130
45	Home Savings	Office	200,000	1.28	0.98	2.26	255	195	450
		Retail	10,000	22.50	22.50	45.0	225	225	225

TABLE 6 (Continued)

TRIP GENERATION
MIDDAY PEAK HOUR
DEVELOPMENT FORECASTS
1990 - 1995

Project Number	Project Name	Land-Use	Size (S.F.)	Midday Pedestrian Trip Rates			Midday Pedestrian Trips		
				In	Out	Total	In	Out	Total
48	Manu Life	Retail	10,000	22.50	22.50	45.0	225	225	450
49	Reliance II	Office	200,000	1.28	0.98	2.26	255	195	450
50	Barker Brothers Block	Office	350,000	1.28	0.98	2.26	450	345	795
		Retail	100,000	22.50	22.50	45.0	2,250	2,250	4,500
51	Little Tokyo	Hotel	250 Units	1.01	1.02	2.03	255	260	515
53	Hilton Conversion	Hotel	400 Units	1.01	1.02	2.03	405	410	815
54	Variety Arts	Hotel	500 Units	1.01	1.02	2.03	505	510	1,015
73	Gas Company	Office	1,000,000	1.28	0.98	2.26	1,280	980	2,260
		Retail	25,000	22.50	22.50	45.0	565	565	1,130
74	Eighth & Figueroa	Office	500,000	1.28	0.98	2.26	640	490	1,130

(1) Office, retail, and residential trip rates developed by Barton-Aschman Associates, Inc. specifically for downtown Los Angeles. Hotel rates are based on Pedestrian Studies of Metro Rail Station Areas, Wilbur Smith and Associates, September, 1984.

TABLE 7

TRIP GENERATION
P.M. PEAK HOUR
DEVELOPMENT FORECASTS
1990 - 1995

Project Number	Project Name	Land-Use	Size (S.F.)	PM Peak Pedestrian Trip Rates[1] In	Out	Total	PM Peak Pedestrian Trips In	Out	Total
2	One City Center	Office	600,000	0.17	1.13	1.30	100	680	780
		Retail	15,000	8.60	8.90	17.50	130	135	265
38	Bunker Hill "W-1"	Office	500,000	0.17	1.13	1.30	85	565	650
		Retail	50,000	8.60	8.90	17.50	430	445	875
39	Cal Plaza III - A	Office	1,100,000	0.17	1.13	1.30	185	1,245	1,430
		Retail	20,000	8.60	8.90	17.50	170	180	350
40	Pershing Square Center	Office	600,000	0.17	1.13	1.30	100	680	780
41	Jewelry Center II	Office	200,000	0.17	1.13	1.30	35	225	260
		Retail	20,000	8.60	8.90	17.50	170	180	350
42	Church of Open Door	Office	500,000	0.17	1.13	1.30	85	565	650
		Retail	10,000	8.60	8.90	17.50	85	90	175
43	Citicorp III	Office	900,000	0.17	1.13	1.30	155	1,015	1,170
44	Variety Arts	Office	500,000	0.17	1.13	1.30	85	565	650
45	Home Savings	Office	200,000	0.17	1.13	1.30	35	225	260
		Retail	10,000	8.60	8.90	17.50	85	90	175

TABLE 7 (Continued)

TRIP GENERATION
P.M. PEAK HOUR
DEVELOPMENT FORECASTS
1990 - 1995

Project Number	Project Name	Land-Use	Size (S.F.)	PM Peak Pedestrian Trip Rates			PM Peak Pedestrian Trips		
				In	Out	Total	In	Out	Total
48	Manu Life	Retail	10,000	8.60	8.90	17.50	85	90	175
49	Reliance II	Office	200,000	0.17	1.13	1.30	35	225	260
50	Barker Brothers Block	Office	350,000	0.17	1.13	1.30	60	395	455
		Retail	100,000	8.60	8.90	17.50	860	890	1,750
51	Little Tokyo	Hotel	250 Units	1.01	1.02	2.03	255	255	510
53	Hilton Conversion	Hotel	400 Units	1.01	1.02	2.03	405	410	815
54	Variety Arts	Hotel	500 Units	1.01	1.02	2.03	505	510	1,015
73	Gas Company	Office	1,000,000	0.17	1.13	1.30	170	1,130	1,300
		Retail	25,000	8.60	8.90	17.50	215	225	440
74	Eighth & Figueroa	Office	500,000	0.17	1.13	1.30	85	565	650

(1) Office, retail, and residential trip rates developed by Barton-Aschman Associates, Inc. specifically for downtown Los Angeles. Hotel rates are based on Pedestrian Studies of Metro Rail Station Areas, Wilbur Smith and Associates, September, 1984..

use expected and its distance from the Metro Rail stations, retail, and restaurant areas, for example.

The walking distance guidelines used to assign the pedestrian trips generated by future developments were as follows:

- A work-related trip (i.e., to and from parking areas, bus stops, Metro Rail station areas) averaged approximately one block in length;

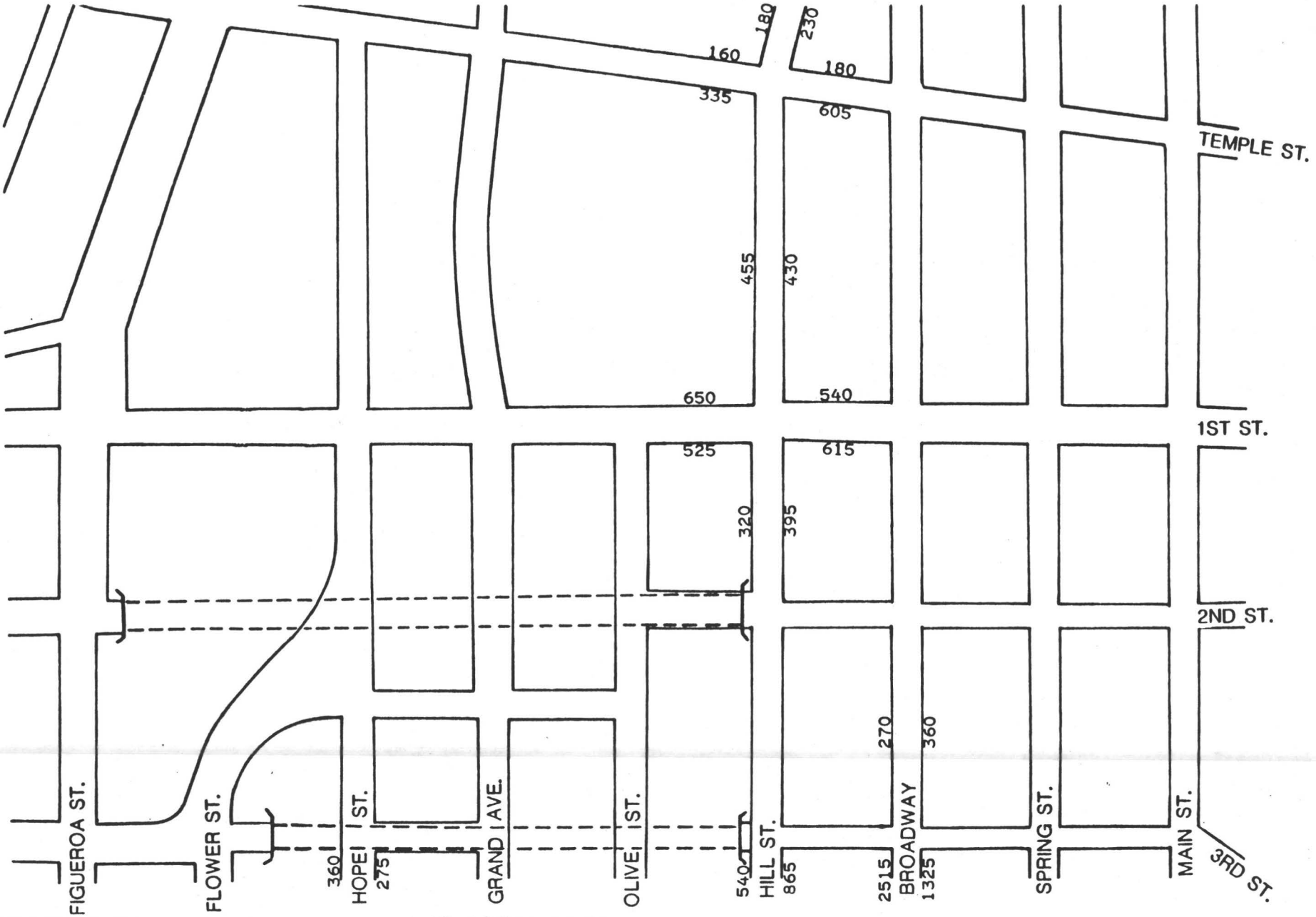
- Shopping and personal business trips averaged approximately two blocks in length; and

- Only 10 percent of all of the trips were more than five blocks in length.

Trip assignments also took into consideration the type of land use in each future development. For example, an office development was assumed to generate primarily shopping and personal business trips during the midday period. The majority of PM peak-hour trips, on the other hand, were assumed to be work trips (i.e., to and from parking areas, bus stops, Metro Rail station areas).

The pedestrian trips generated by future developments were assigned to the existing sidewalk network for both the 1985 - 1989 and 1990 - 1995 time frames.

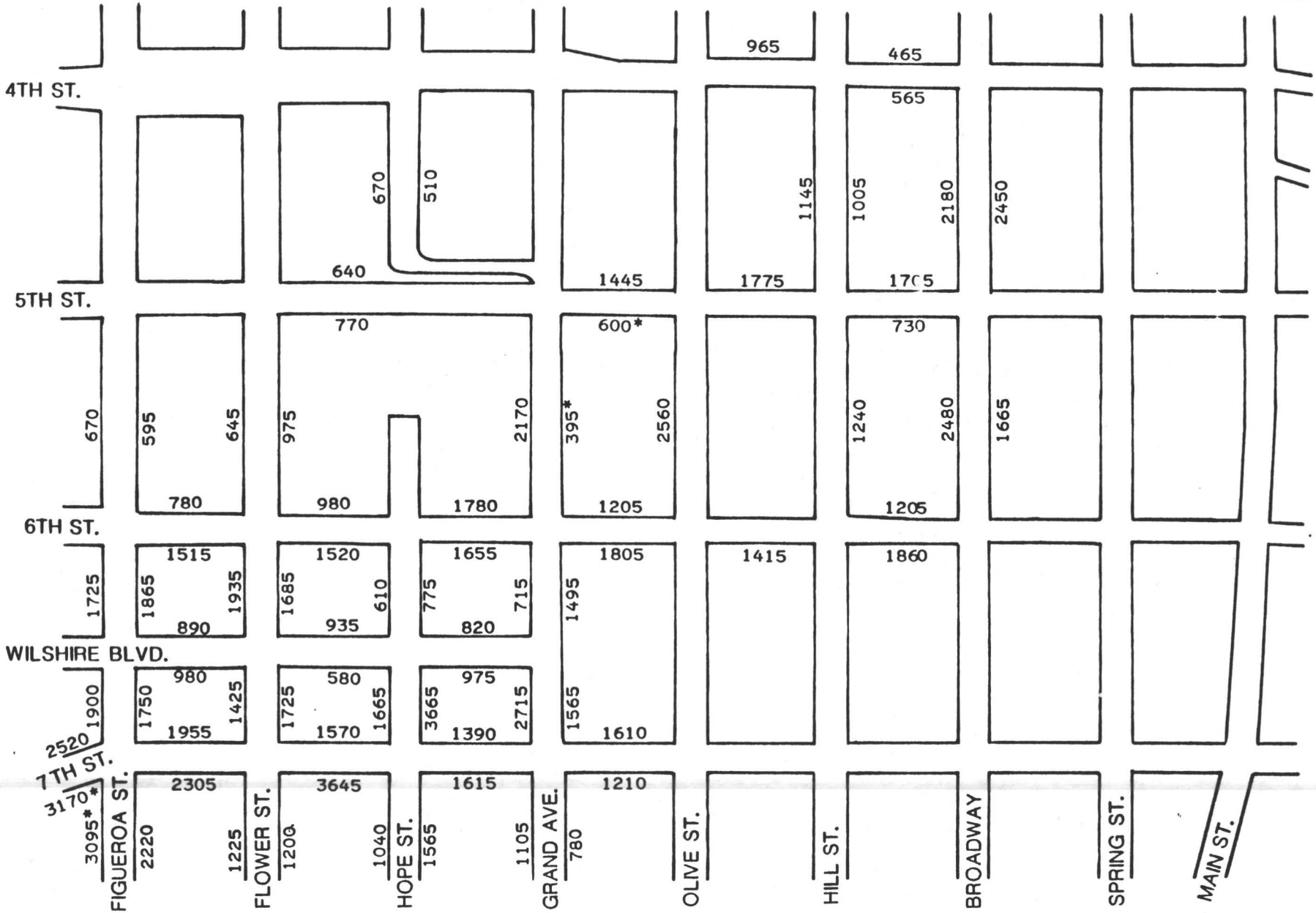
Figures 13A - 13C illustrate the existing plus 1989 future development midblock pedestrian volumes for the midday peak hour. Figures 14A - 14C



EXISTING PLUS FUTURE PROJECTS 1985-1989
MIDDAY PEAK HOUR MIDBLOCK PEDESTRIAN VOLUMES

BARTON ASCHMAN ASSOCIATES, INC.

FIGURE 13A

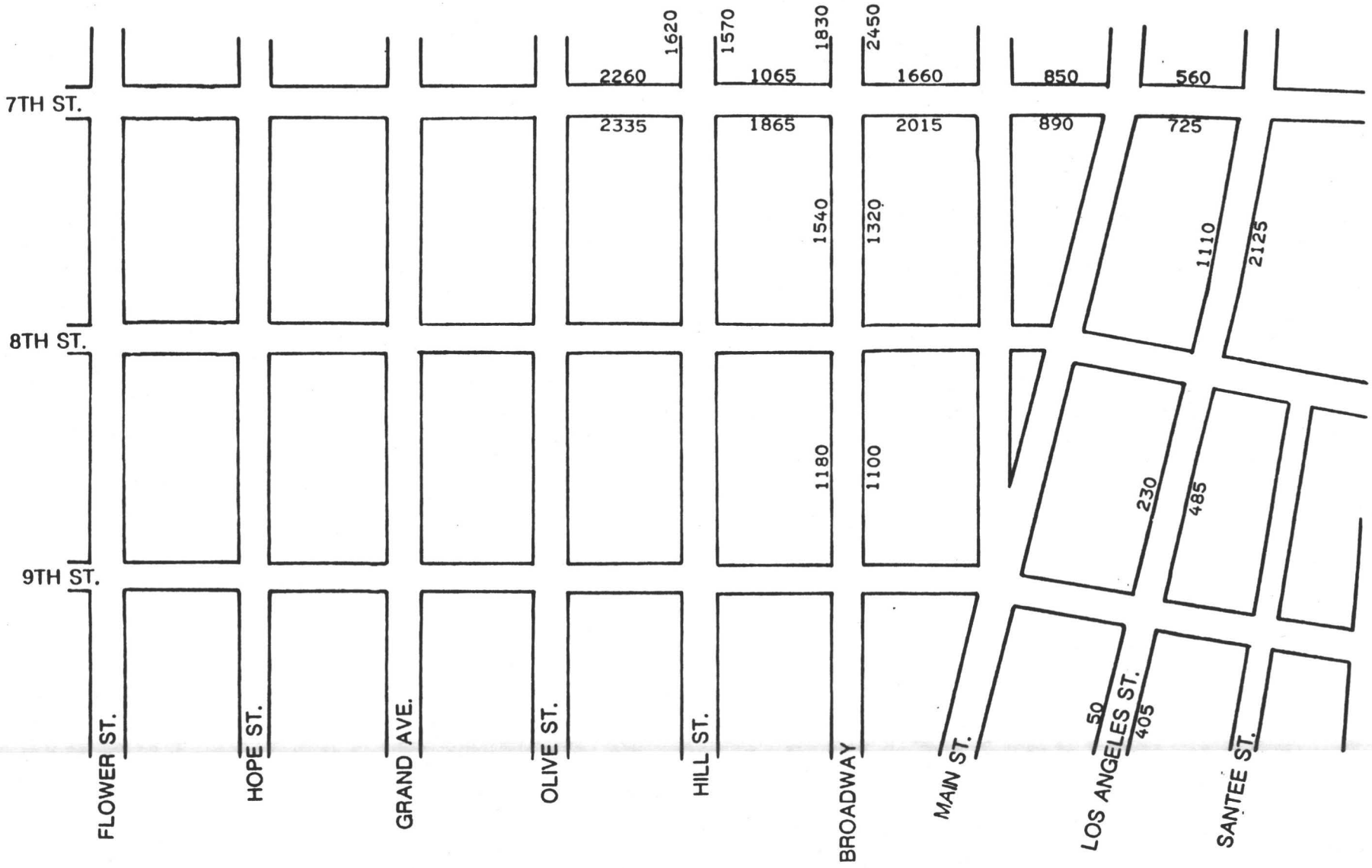


EXISTING PLUS FUTURE PROJECTS 1985–1989
MIDDAY PEAK HOUR MIDBLOCK PEDESTRIAN VOLUMES

BARTON ASCHMAN ASSOCIATES, INC.

LEGEND: * CONSTRUCTION

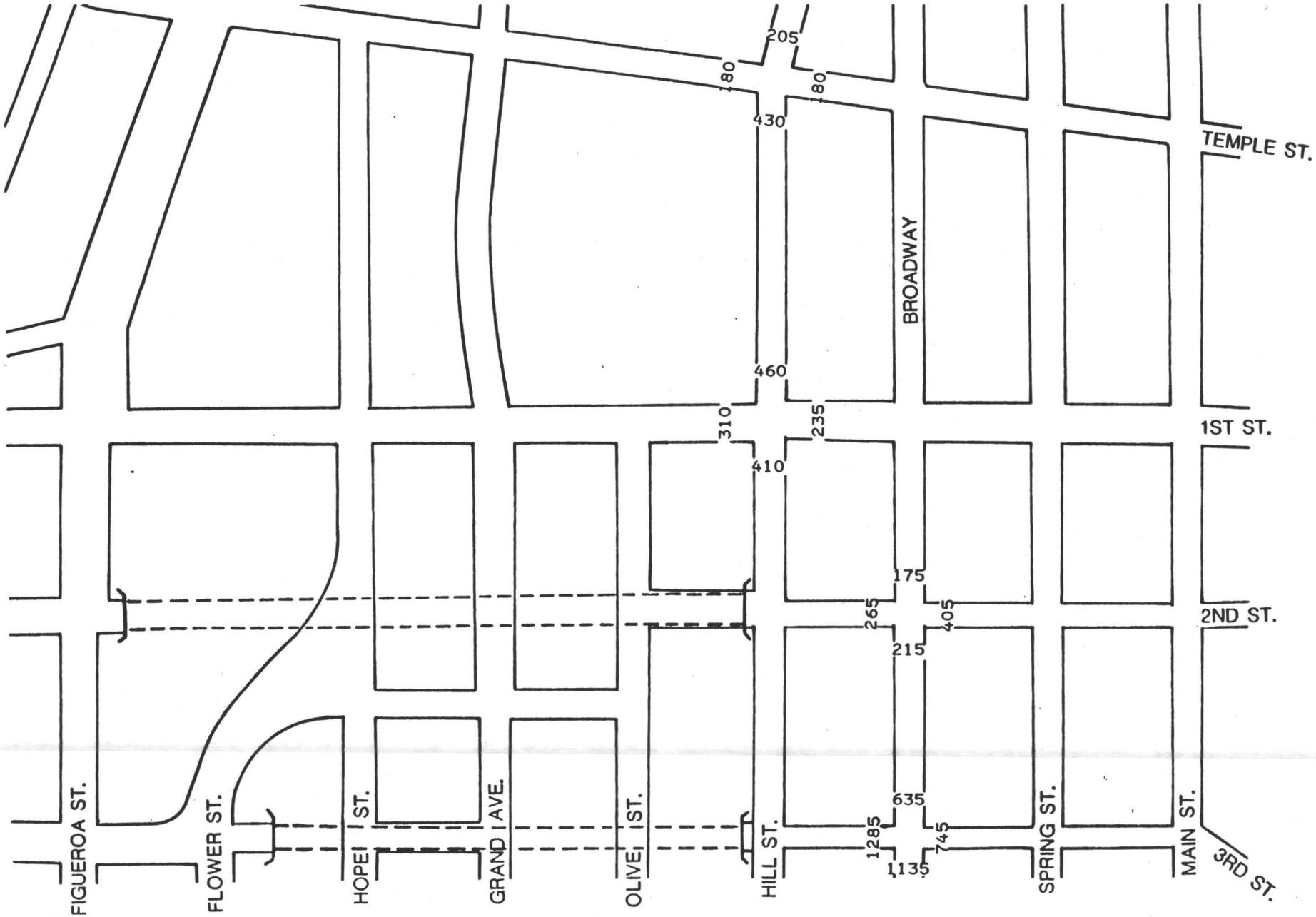
FIGURE
13B



EXISTING PLUS FUTURE PROJECTS 1985 - 1989
MIDDAY PEAK HOUR MIDBLOCK PEDESTRIAN VOLUMES

BARTON ASCHMAN ASSOCIATES, INC.

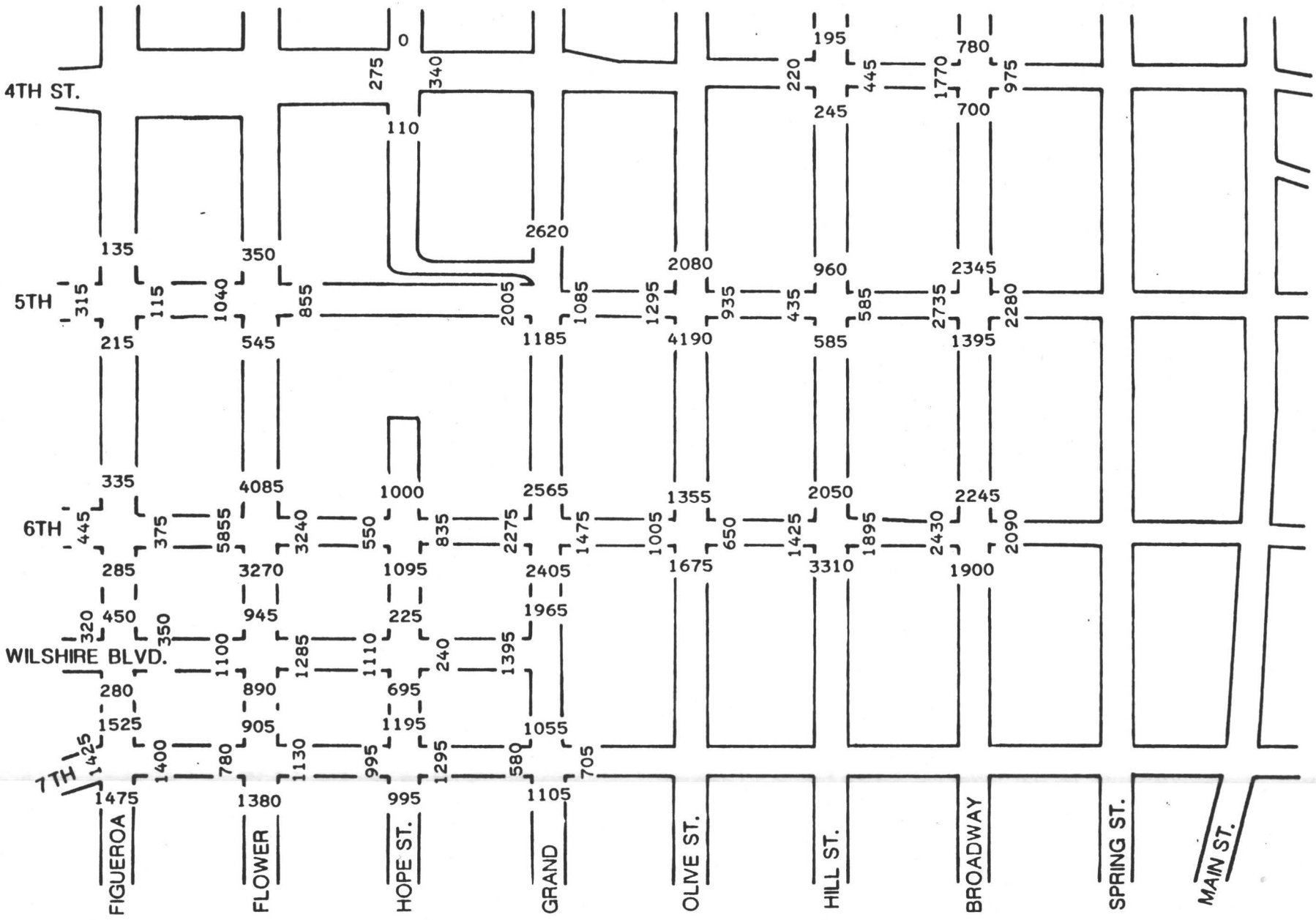
FIGURE 13C



EXISTING PLUS FUTURE PROJECTS 1985–1989
MIDDAY PEAK HOUR CROSSWALK PEDESTRIAN VOLUMES

BARTON ASCHMAN ASSOCIATES, INC.

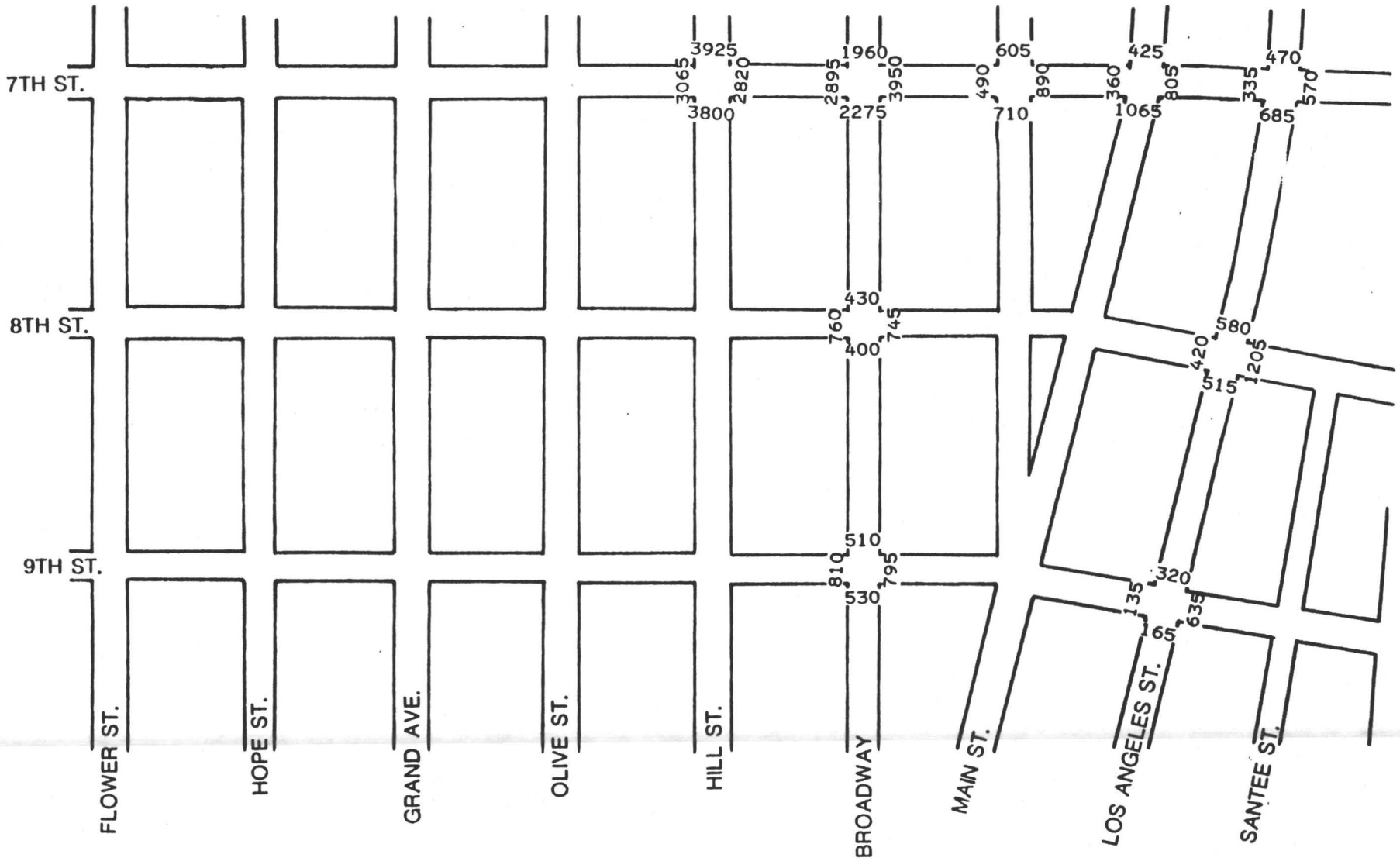
FIGURE
14A



EXISTING PLUS FUTURE PROJECTS 1985-1989
MIDDAY PEAK HOUR CROSSWALK PEDESTRIAN VOLUMES

BARTON ASCHMAN ASSOCIATES, INC.

FIGURE
14B



EXISTING PLUS FUTURE PROJECTS 1985 – 1989
MIDDAY PEAK HOUR CROSSWALK PEDESTRIAN VOLUMES

BARTON ASCHMAN ASSOCIATES, INC.

FIGURE 14C

show the existing plus 1989 future development crosswalk pedestrian volumes for the midday peak hour.

Figures 15A - 15C and 16A - 16C include the evening peak hour existing plus 1989 future projects pedestrian volumes for the midblock and crosswalk locations, respectively.

The existing plus 1995 future development midblock pedestrian volumes and crosswalk pedestrian volumes for the midday peak hour are illustrated in Figures 17A - 17C and 18A - 18C, respectively. For the same 1995 development phase, evening peak-hour midblock pedestrian volumes are shown in Figures 19A - 19C, and the evening peak-hour crosswalk pedestrian volumes are illustrated in Figures 20A - 20C.

FUTURE MIDBLOCK PEDESTRIAN FLOW ANALYSIS

In order to evaluate the future midblock pedestrian flow volumes, it was necessary to determine the peak pedestrian flow rate at each midblock location for both the midday and evening peak hours. The pedestrian flow rates are described in terms of pedestrians per foot of effective sidewalk width per minute, or P/F/M.[1] After the flow rates were calculated, the quality of flow at each location was determined through the use of the quality of flow categories listed in Table 1.

The results of the midday peak-hour midblock quality of flow analysis for existing plus 1989 future projects are shown in Figures 21A - 21D. The

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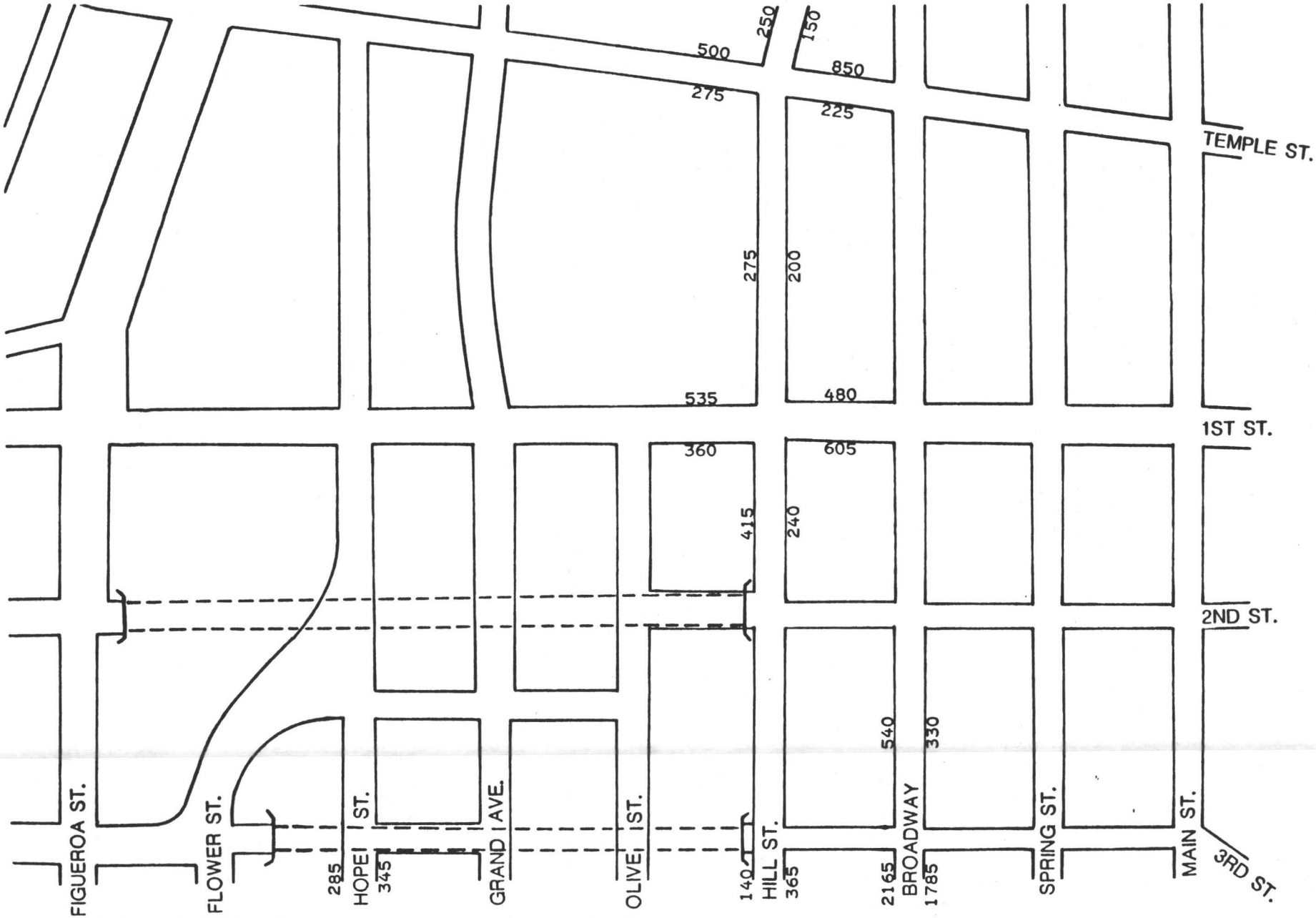
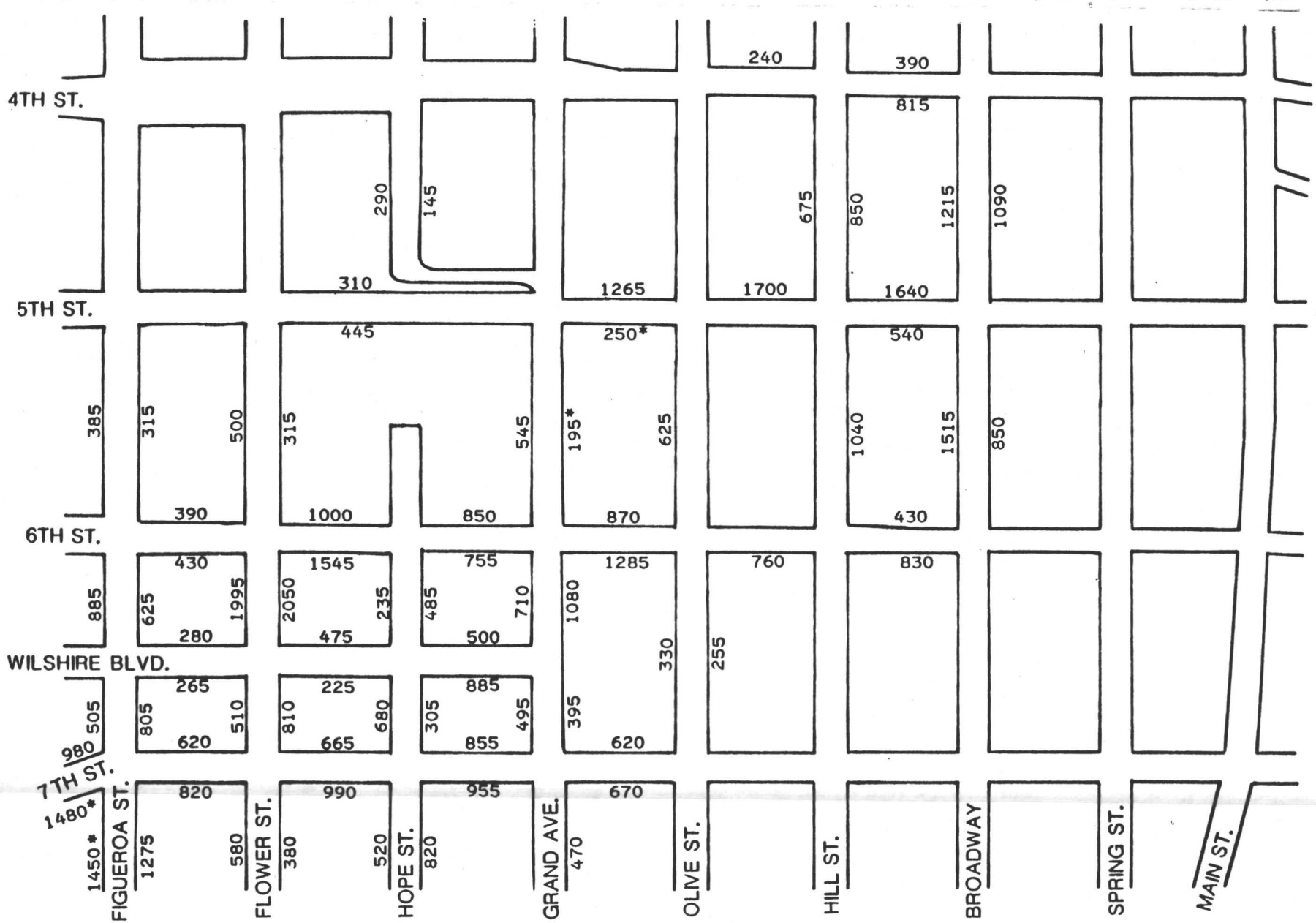
(1) The pedestrian flow rate concept is described in more detail in Chapter 2.



EXISTING PLUS FUTURE PROJECTS 1985-1989
P.M. PEAK HOUR MIDBLOCK PEDESTRIAN VOLUMES

BARTON ASCHMAN ASSOCIATES, INC.

FIGURE 15A

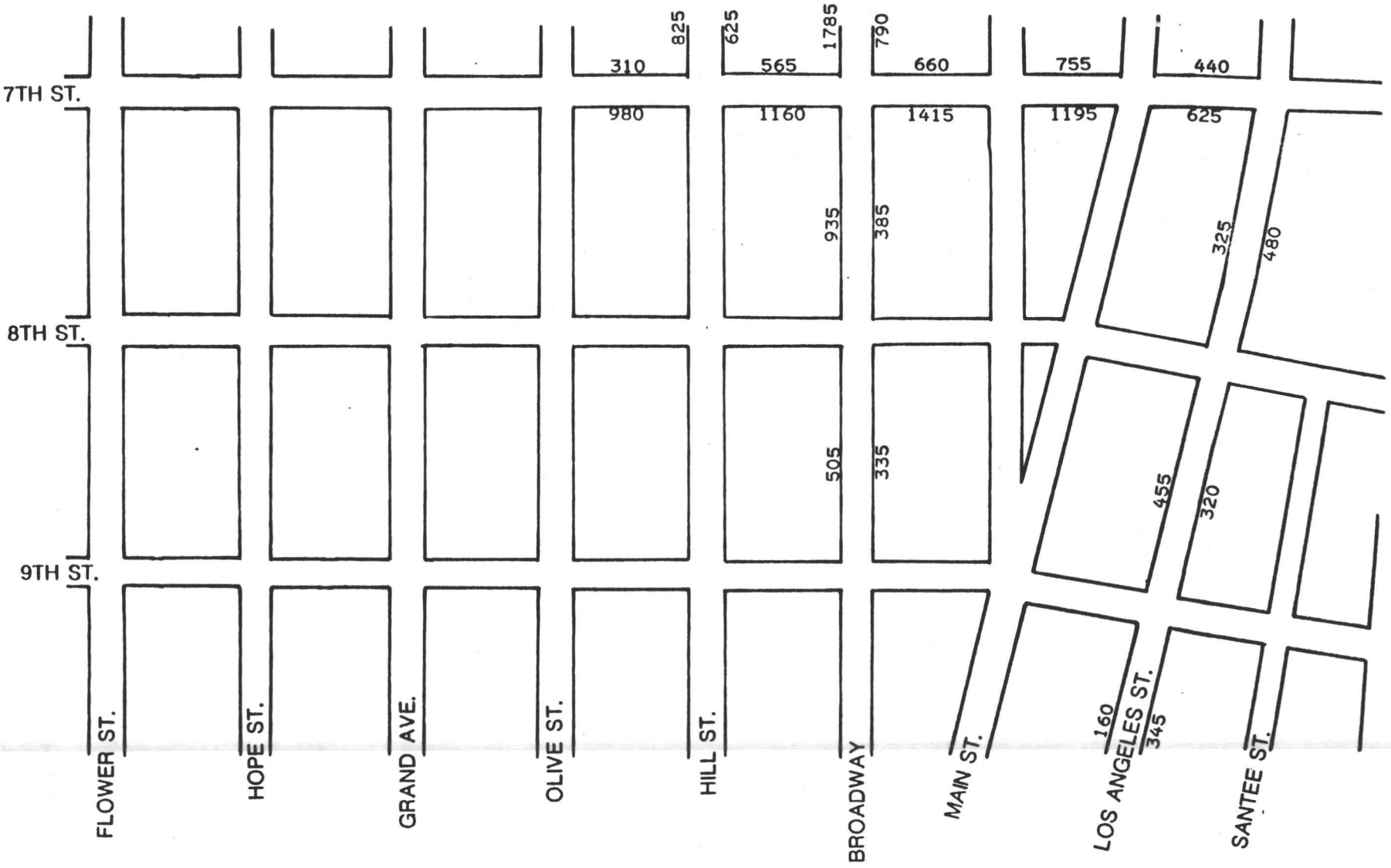


EXISTING PLUS FUTURE PROJECTS 1985-1989
P.M. PEAK HOUR MIDBLOCK PEDESTRIAN VOLUMES

BARTON ASCHMAN ASSOCIATES, INC.

LEGEND: * CONSTRUCTION

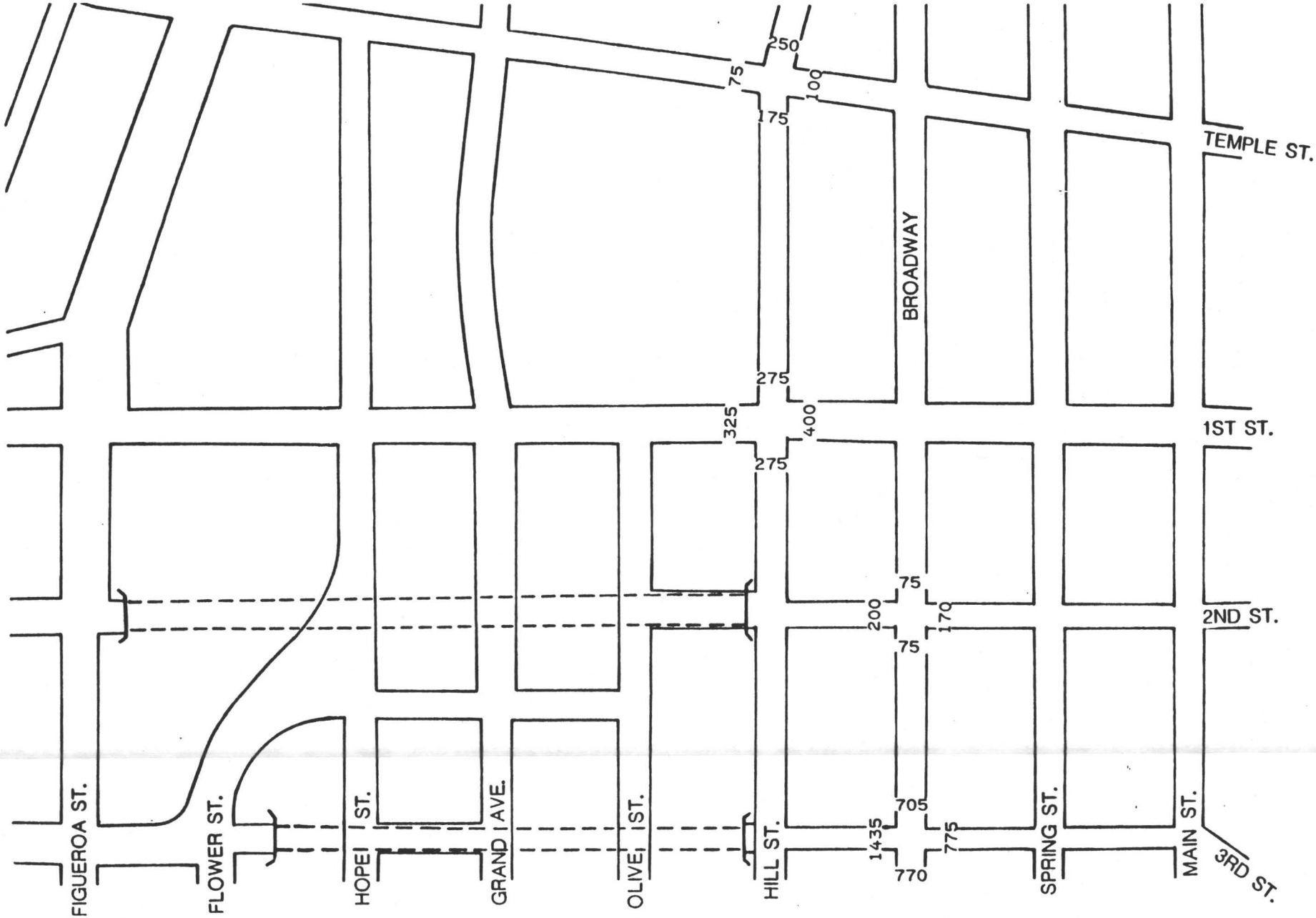
FIGURE 15B



EXISTING PLUS FUTURE PROJECTS 1985–1989
P.M. PEAK HOUR MIDBLOCK PEDESTRIAN VOLUMES

BARTON ASCHMAN ASSOCIATES, INC.

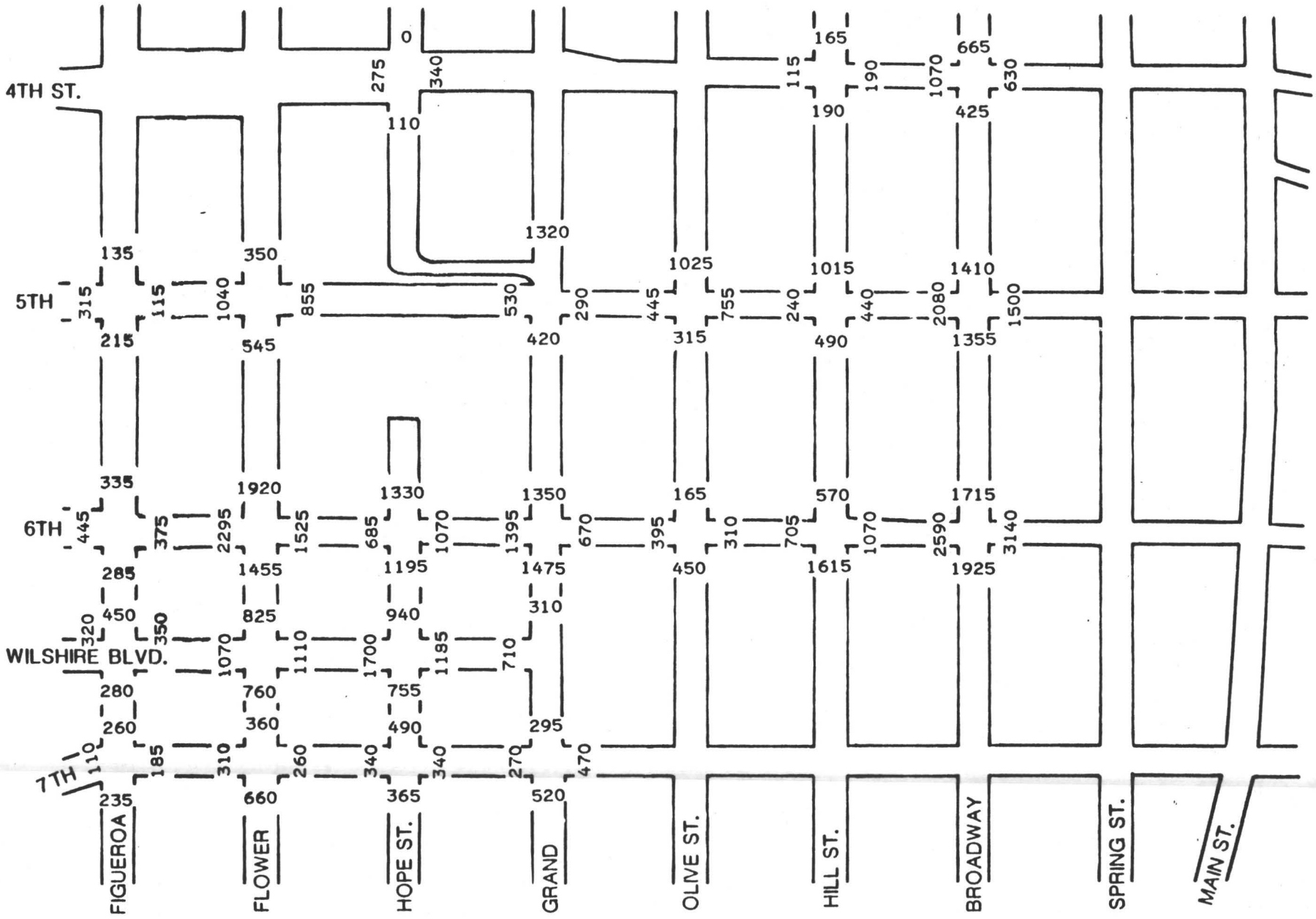
FIGURE 15C



EXISTING PLUS FUTURE PROJECTS 1985-1989
P.M. PEAK HOUR CROSSWALK PEDESTRIAN VOLUMES

BARTON ASCHMAN ASSOCIATES INC.

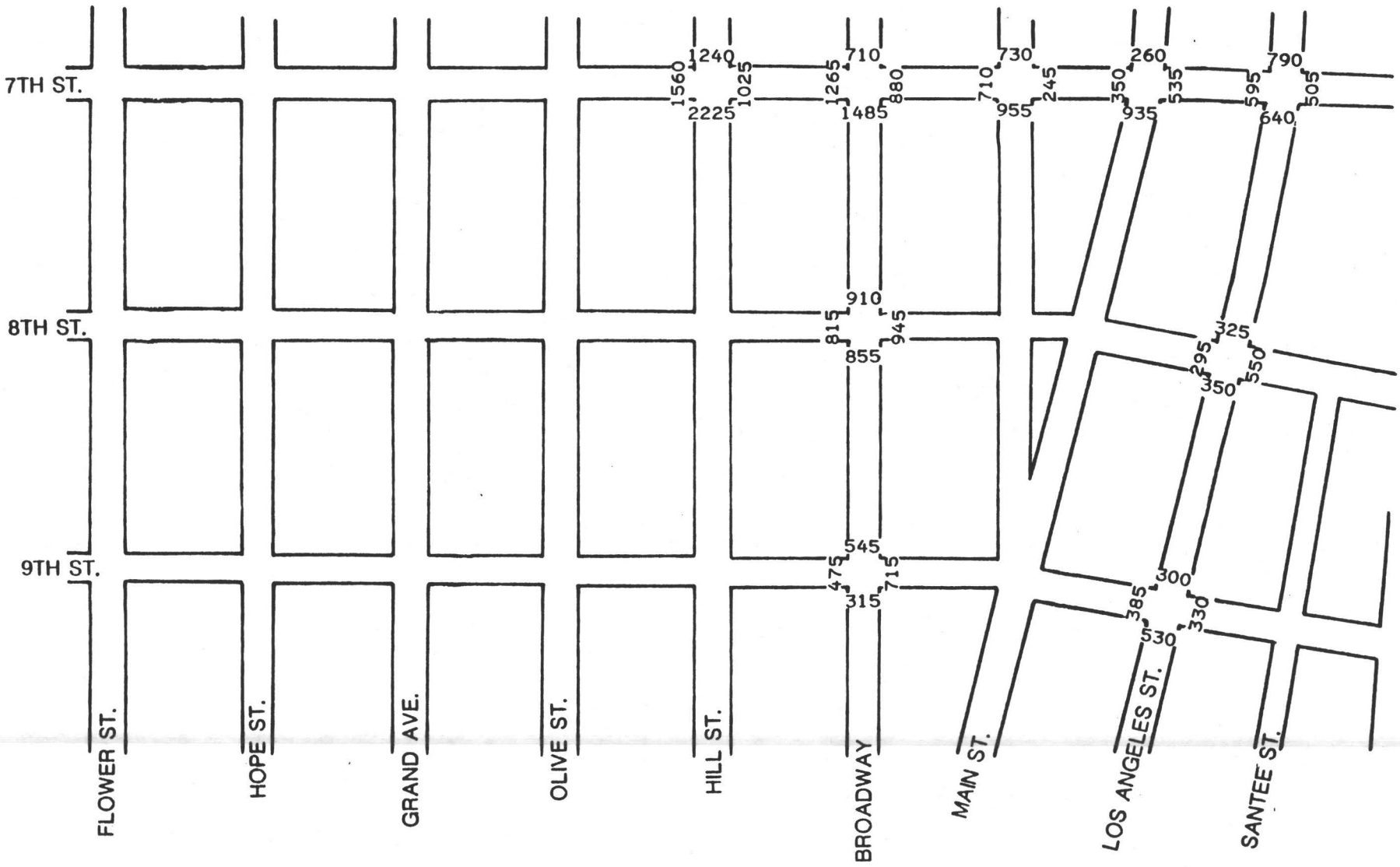
FIGURE 16A



EXISTING PLUS FUTURE PROJECTS 1985–1989
P.M. PEAK HOUR CROSSWALK PEDESTRIAN VOLUMES

BARTON ASCHMAN ASSOCIATES INC.

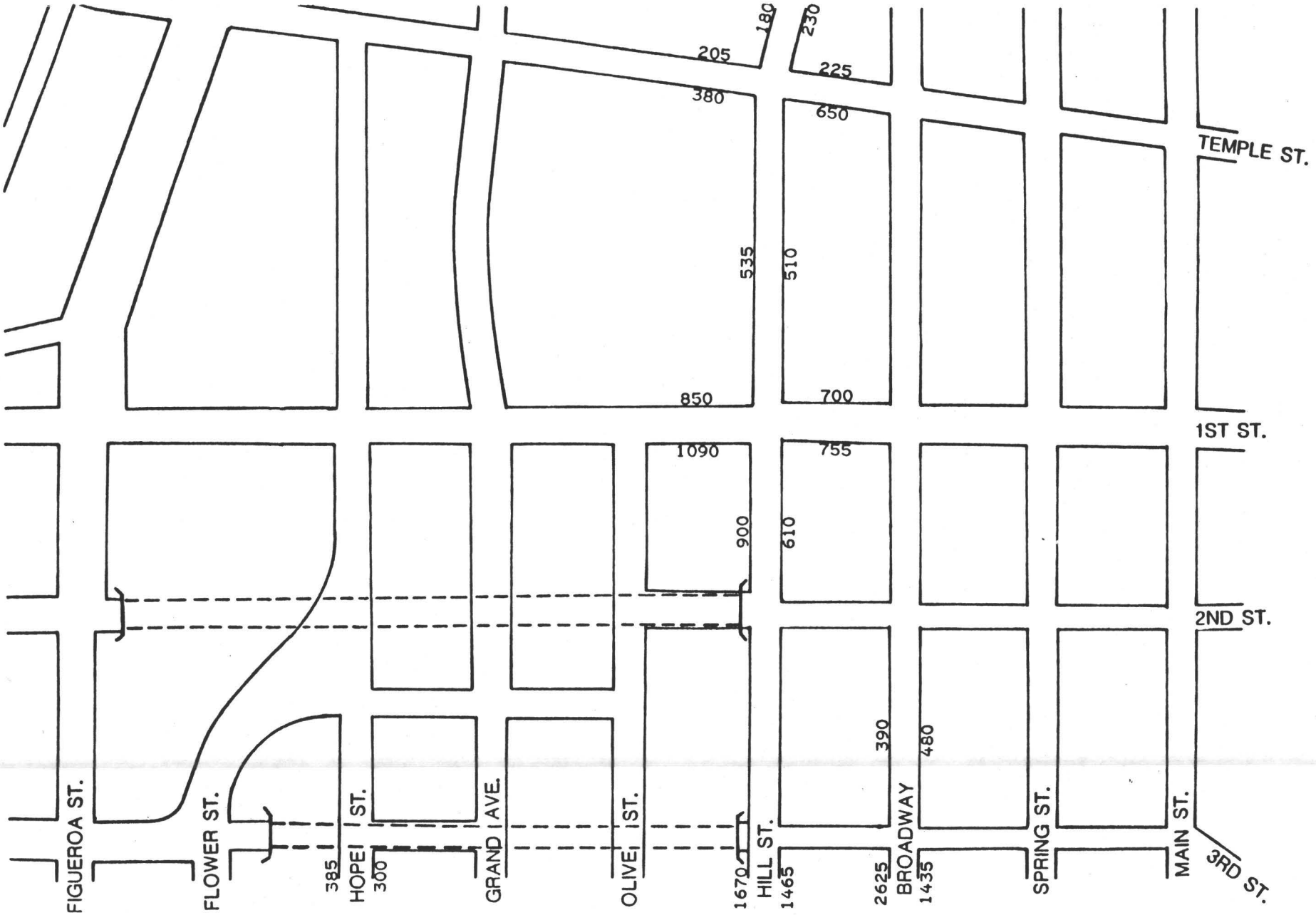
FIGURE
16B



EXISTING PLUS FUTURE PROJECTS 1985–1989
P.M. PEAK HOUR CROSSWALK PEDESTRIAN VOLUMES

BARTON ASCHMAN ASSOCIATES, INC.

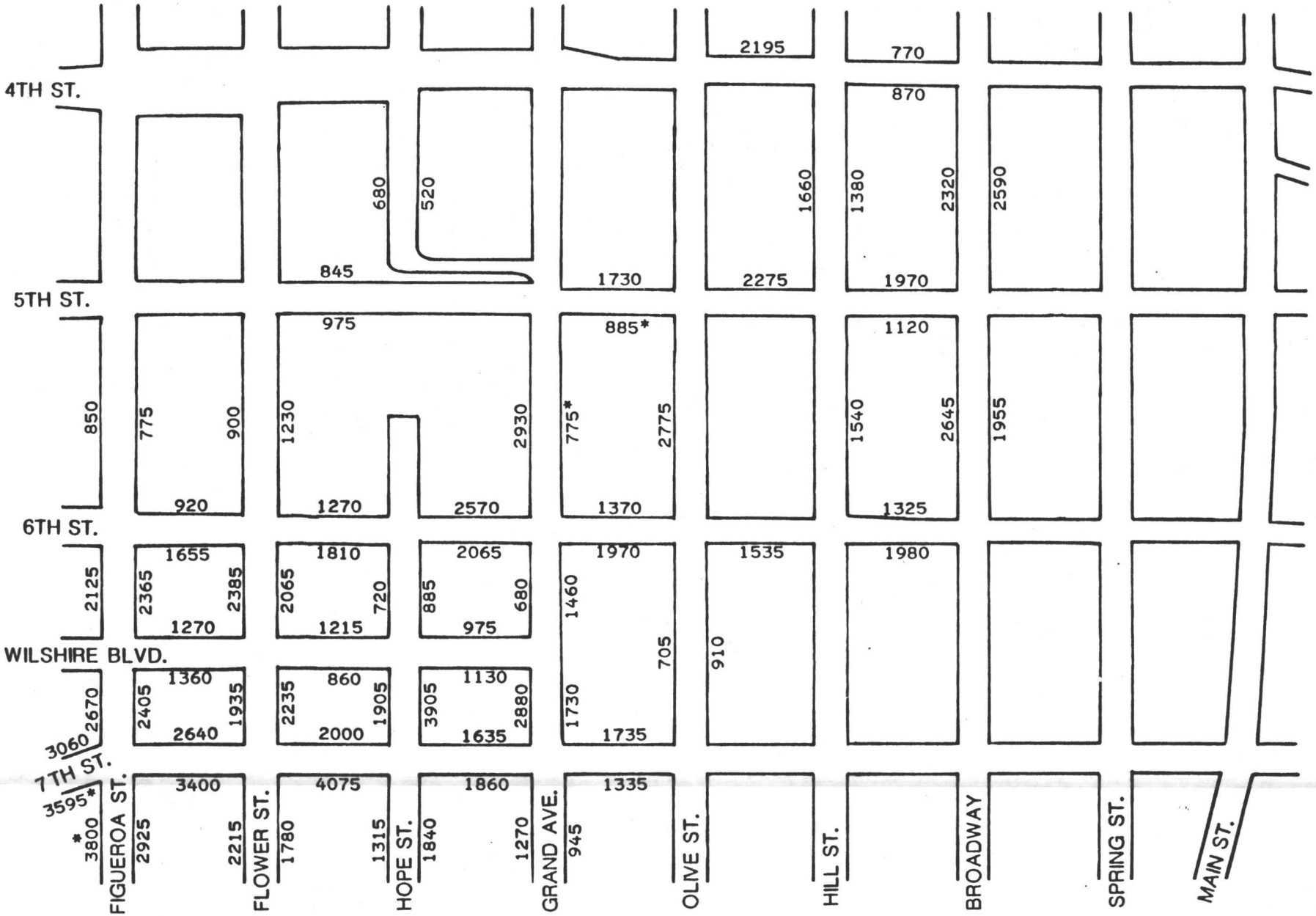
FIGURE 16C



EXISTING PLUS FUTURE PROJECTS 1985-1995
MIDDAY PEAK HOUR MIDBLOCK PEDESTRIAN VOLUMES

BARTON ASCHMAN ASSOCIATES, INC.

FIGURE
17A

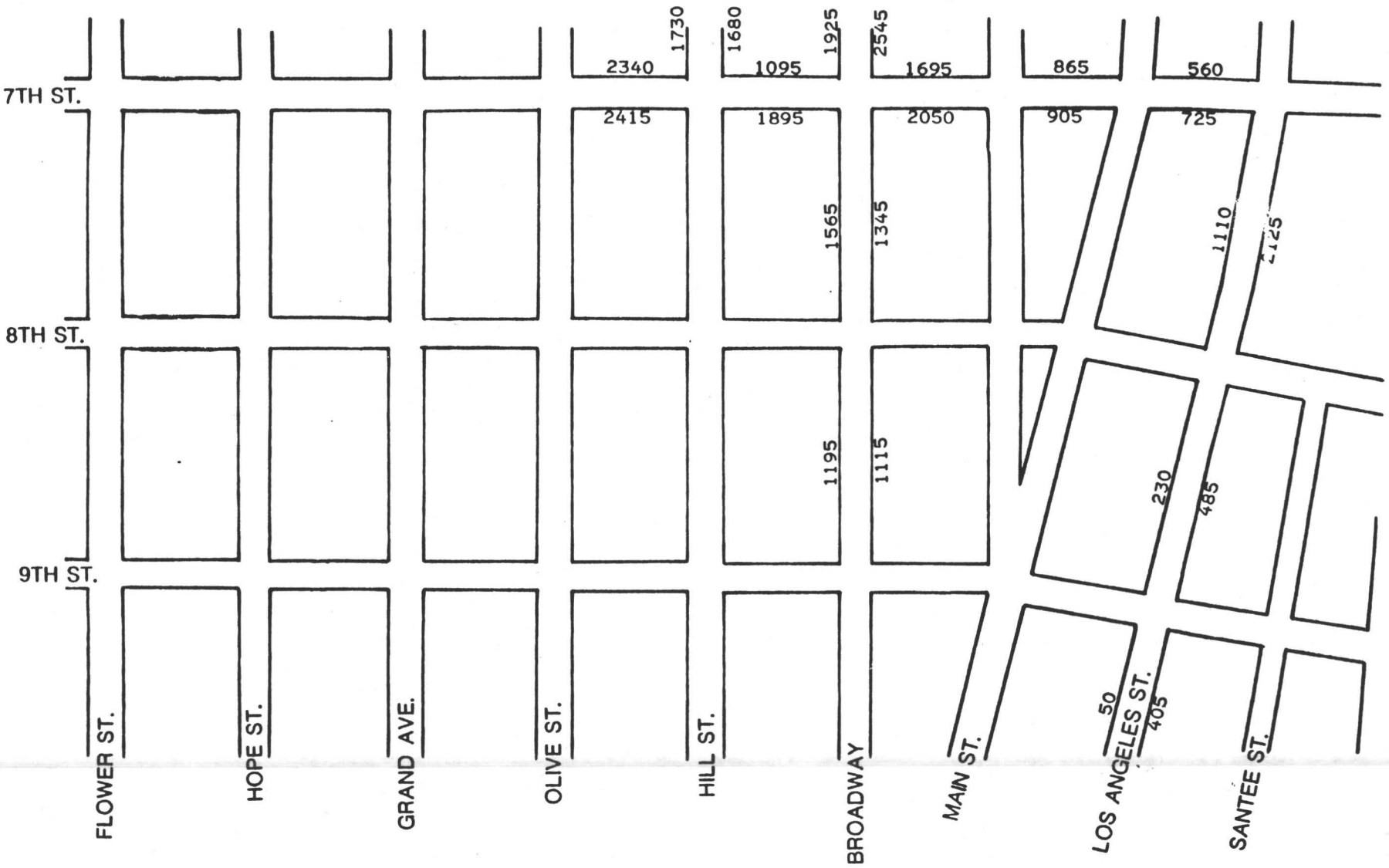


EXISTING PLUS FUTURE PROJECTS 1985-1995
MIDDAY PEAK HOUR MIDBLOCK PEDESTRIAN VOLUMES

BARTON ASCHMAN ASSOCIATES, INC.

LEGEND: * CONSTRUCTION

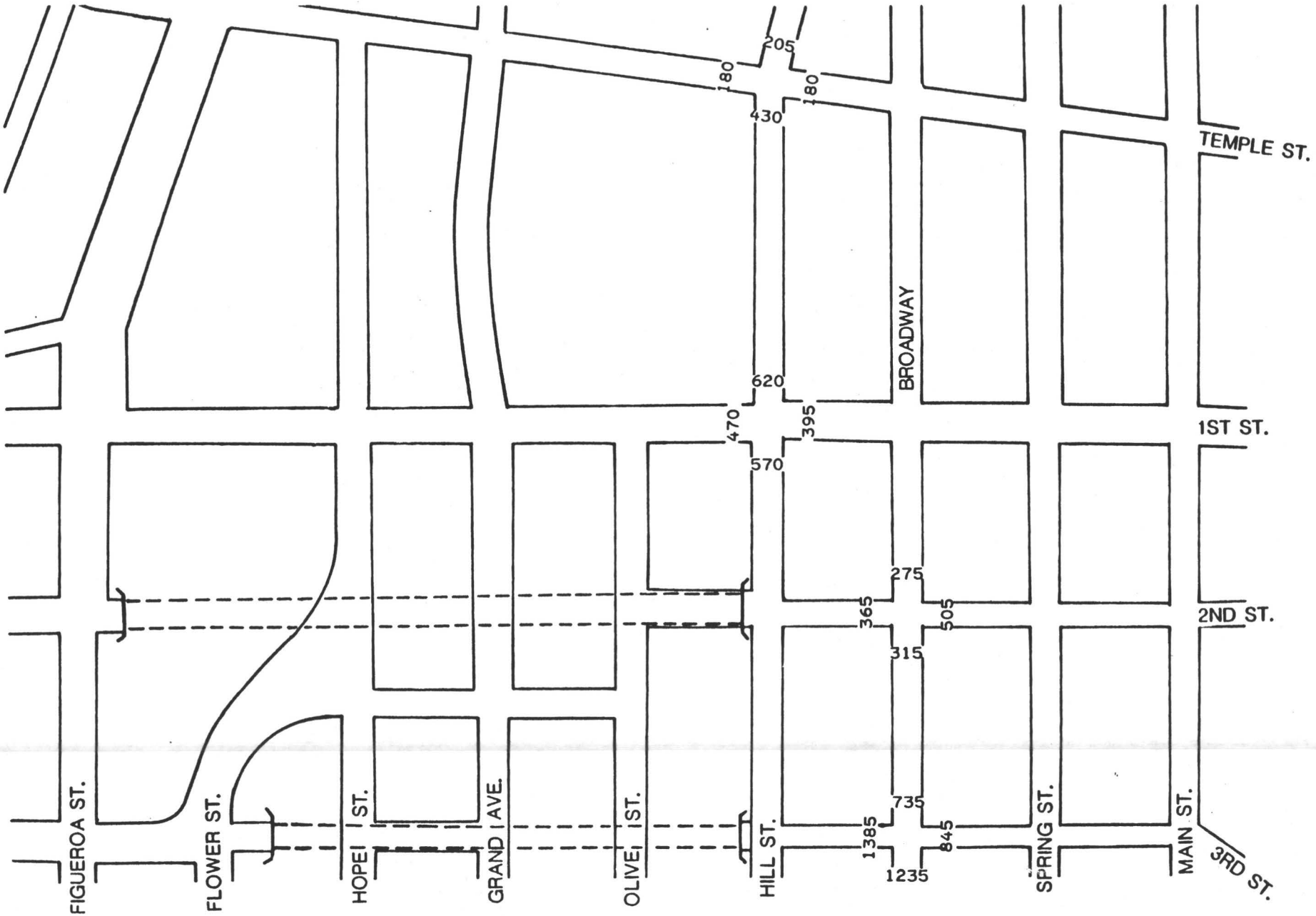
FIGURE
17B



EXISTING PLUS FUTURE PROJECTS 1985-1995
MIDDAY PEAK HOUR MIDBLOCK PEDESTRIAN VOLUMES

BARTON ASCHMAN ASSOCIATES, INC.

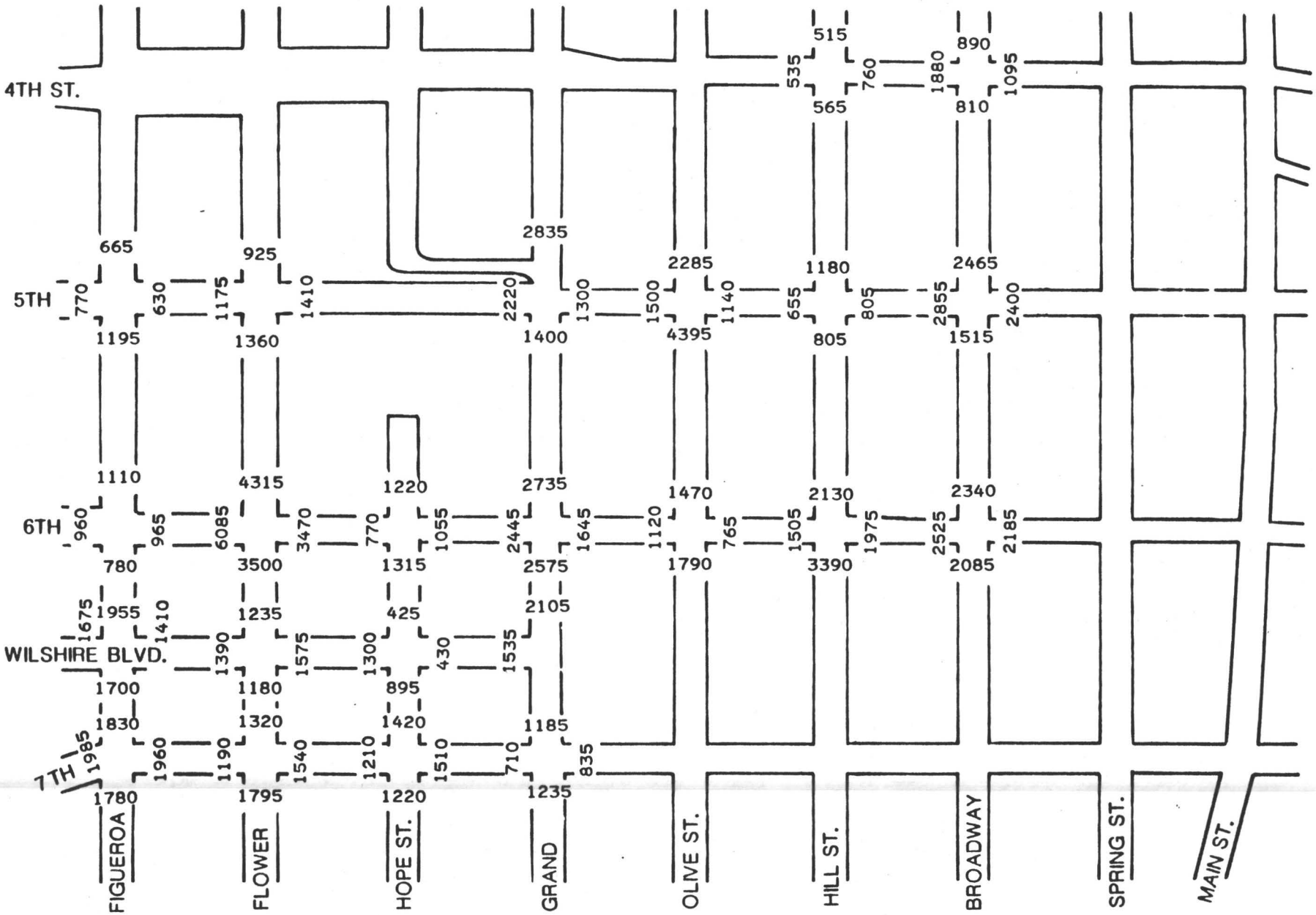
FIGURE 17C



EXISTING PLUS FUTURE PROJECTS 1985-1995
MIDDAY PEAK HOUR CROSSWALK PEDESTRIAN VOLUMES

BARTON ASCHMAN ASSOCIATES, INC.

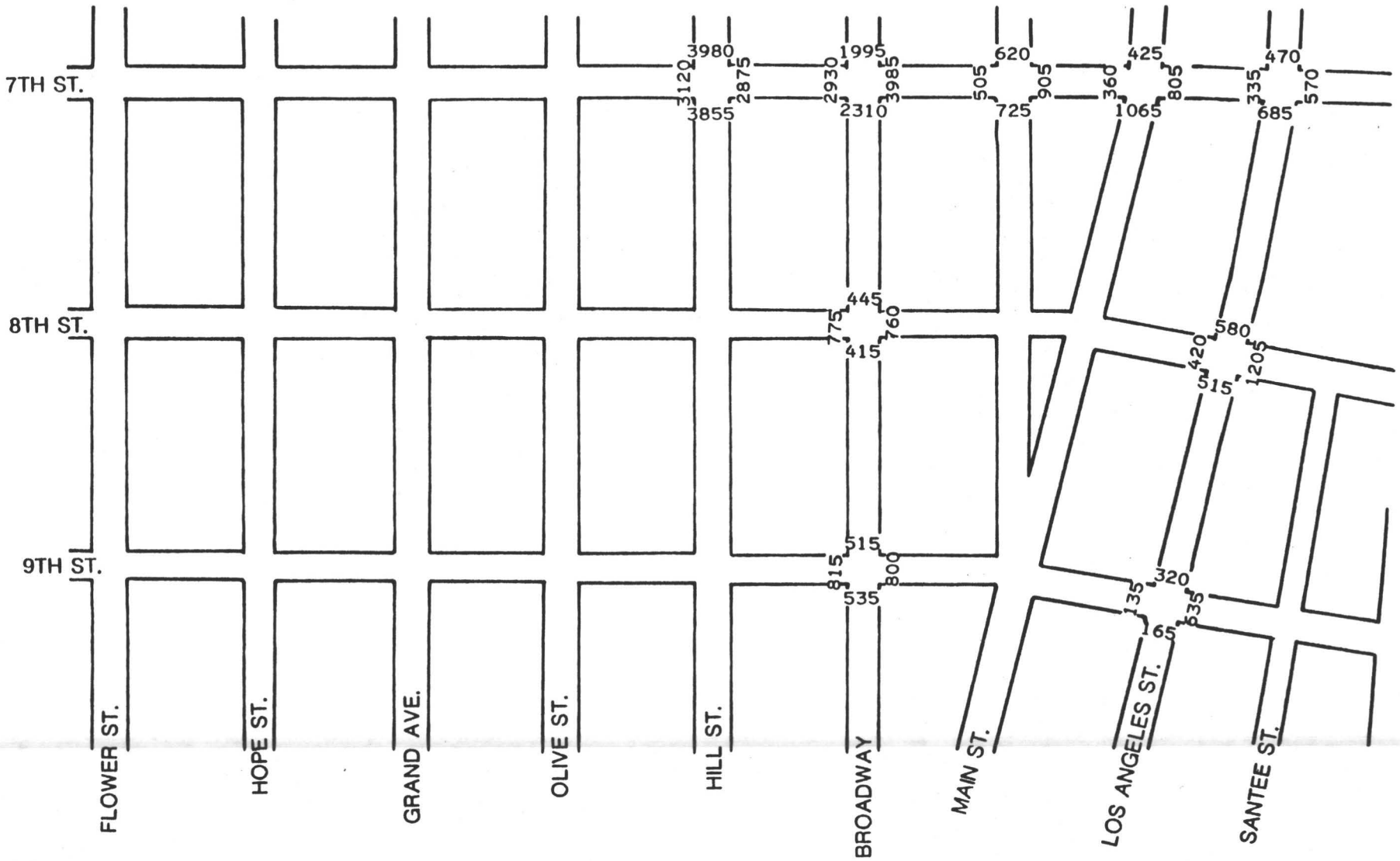
FIGURE
18A



EXISTING PLUS FUTURE PROJECTS 1985-1995
MIDDAY PEAK HOUR CROSSWALK PEDESTRIAN VOLUMES

BARTON ASCHMAN ASSOCIATES INC.

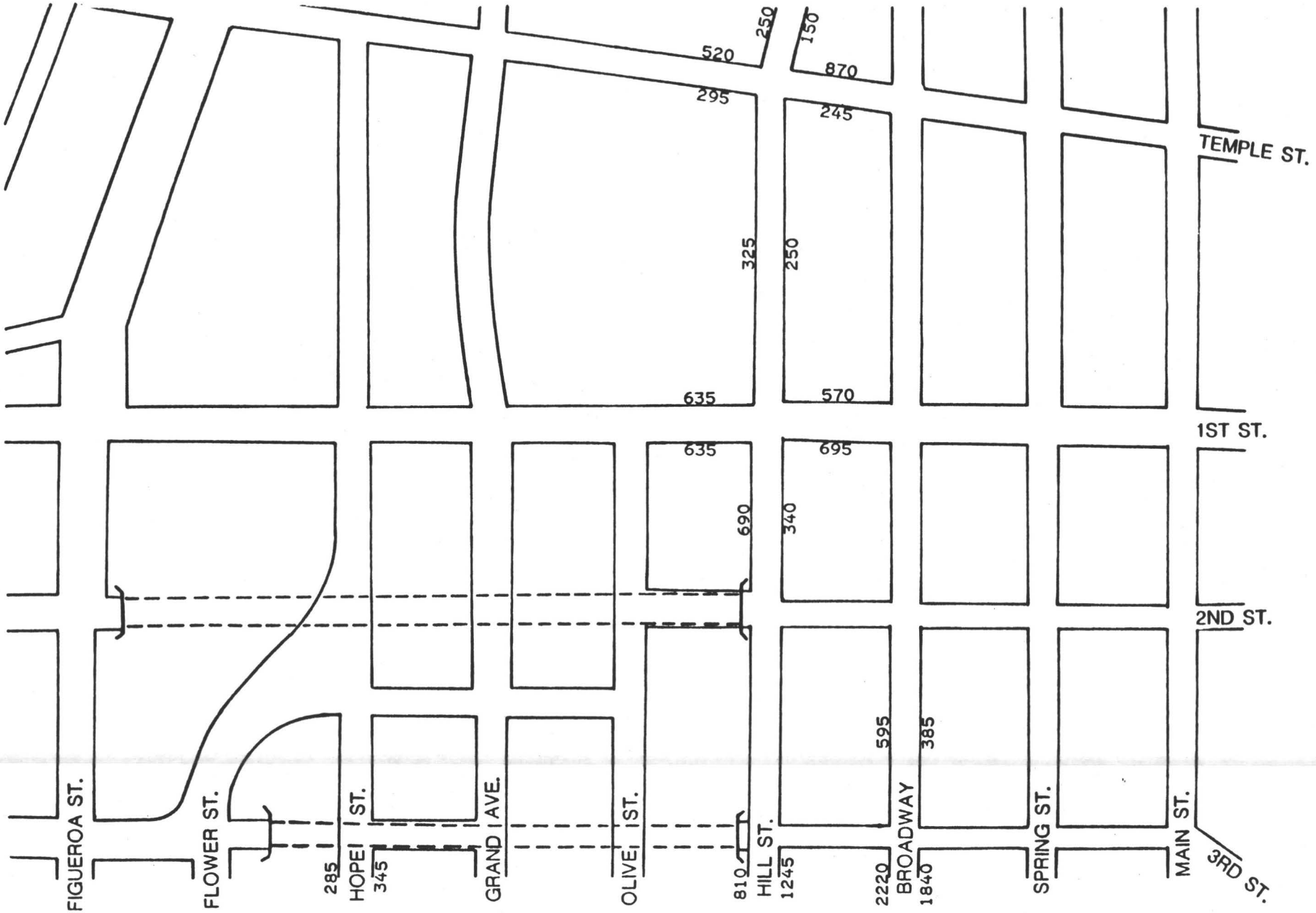
FIGURE 18B



EXISTING PLUS FUTURE PROJECTS 1985-1995
MIDDAY PEAK HOUR CROSSWALK PEDESTRIAN VOLUMES

BARTON ASCHMAN ASSOCIATES, INC.

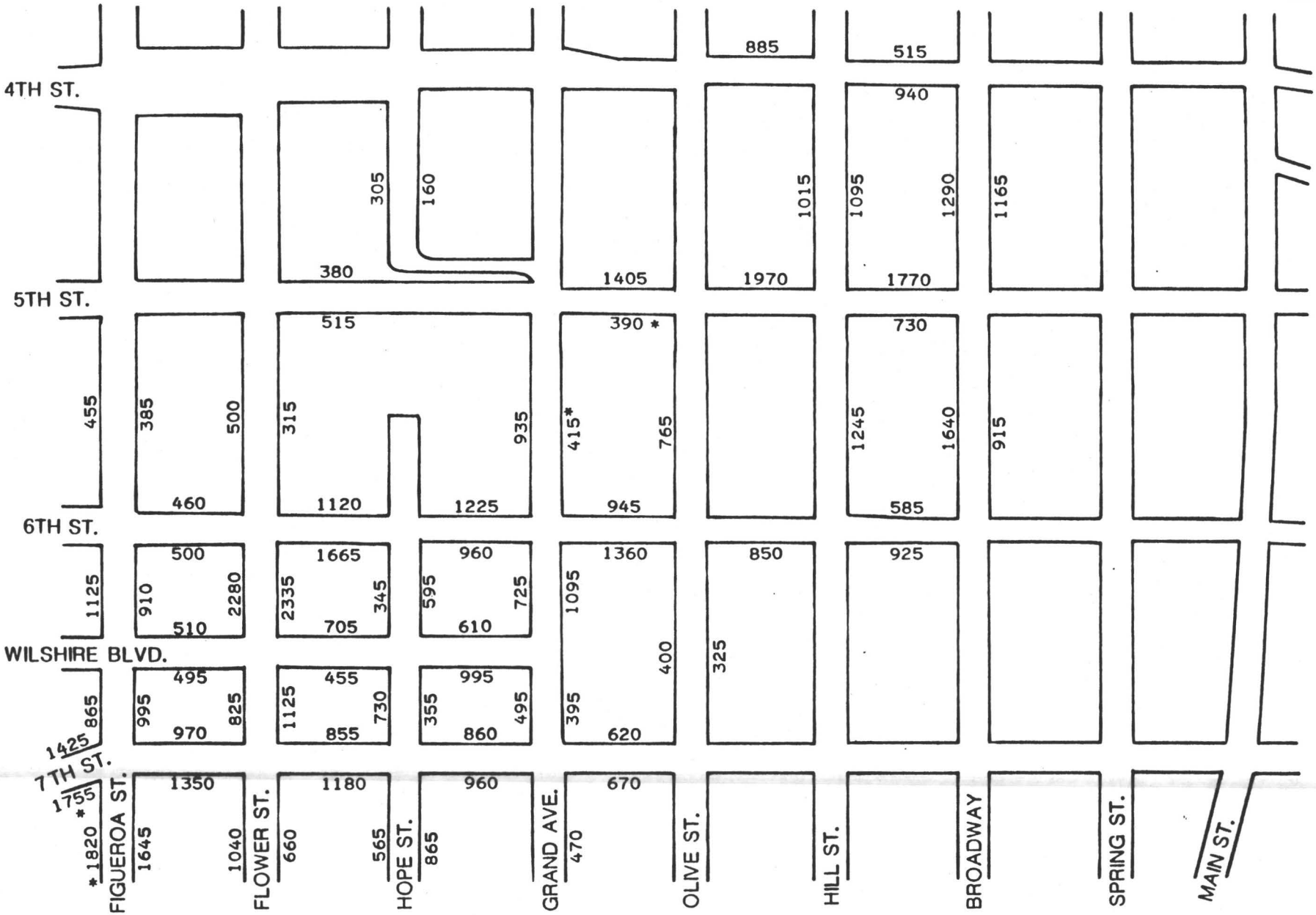
FIGURE 18C



EXISTING PLUS FUTURE PROJECTS 1985-1995
P.M. PEAK HOUR MIDBLOCK PEDESTRIAN VOLUMES

BARTON ASCHMAN ASSOCIATES, INC.

FIGURE
19A

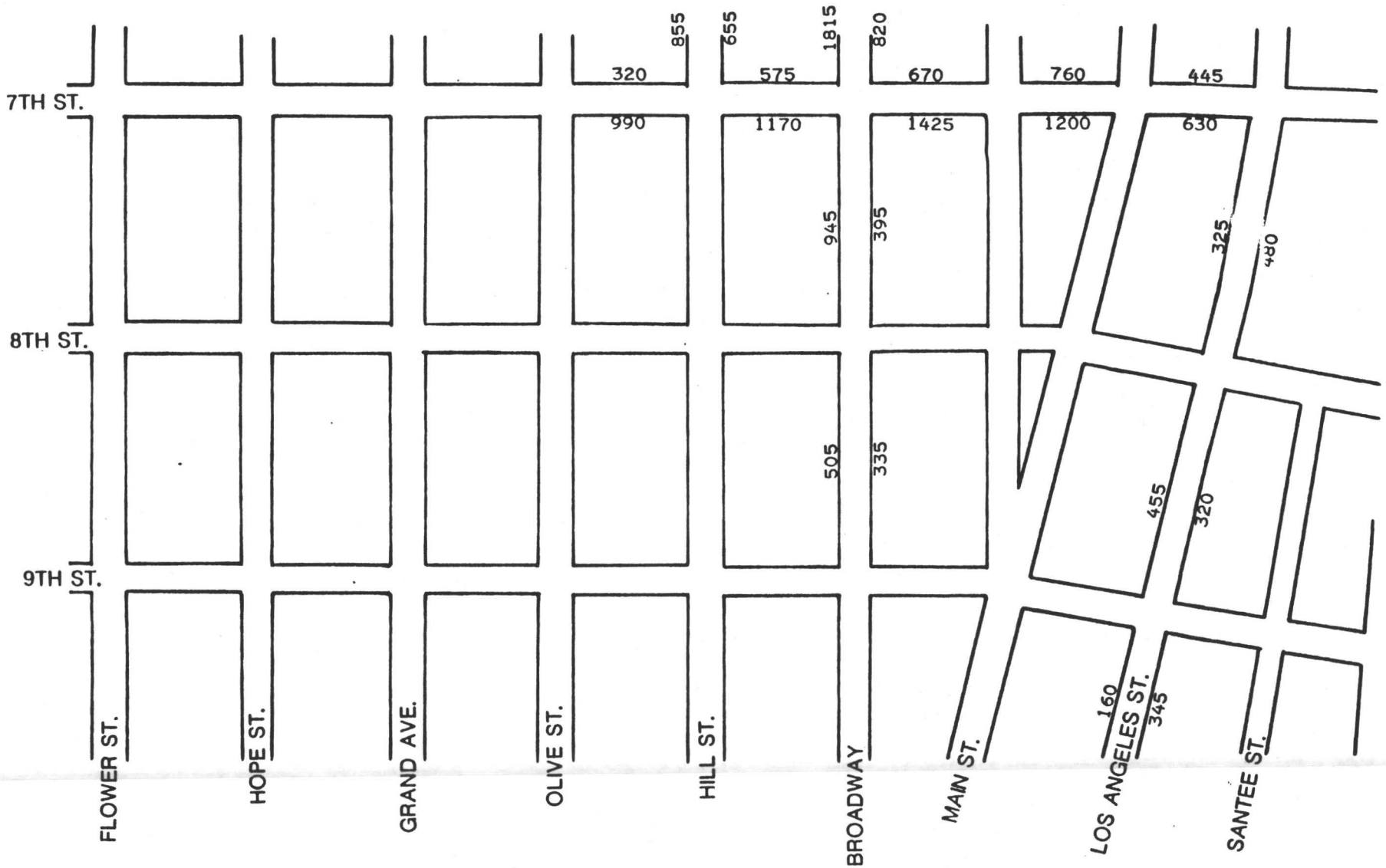


EXISTING PLUS FUTURE PROJECTS 1985-1995
P.M. PEAK HOUR MIDBLOCK PEDESTRIAN VOLUMES

BARTON ASCHMAN ASSOCIATES, INC.

*CONSTRUCTION

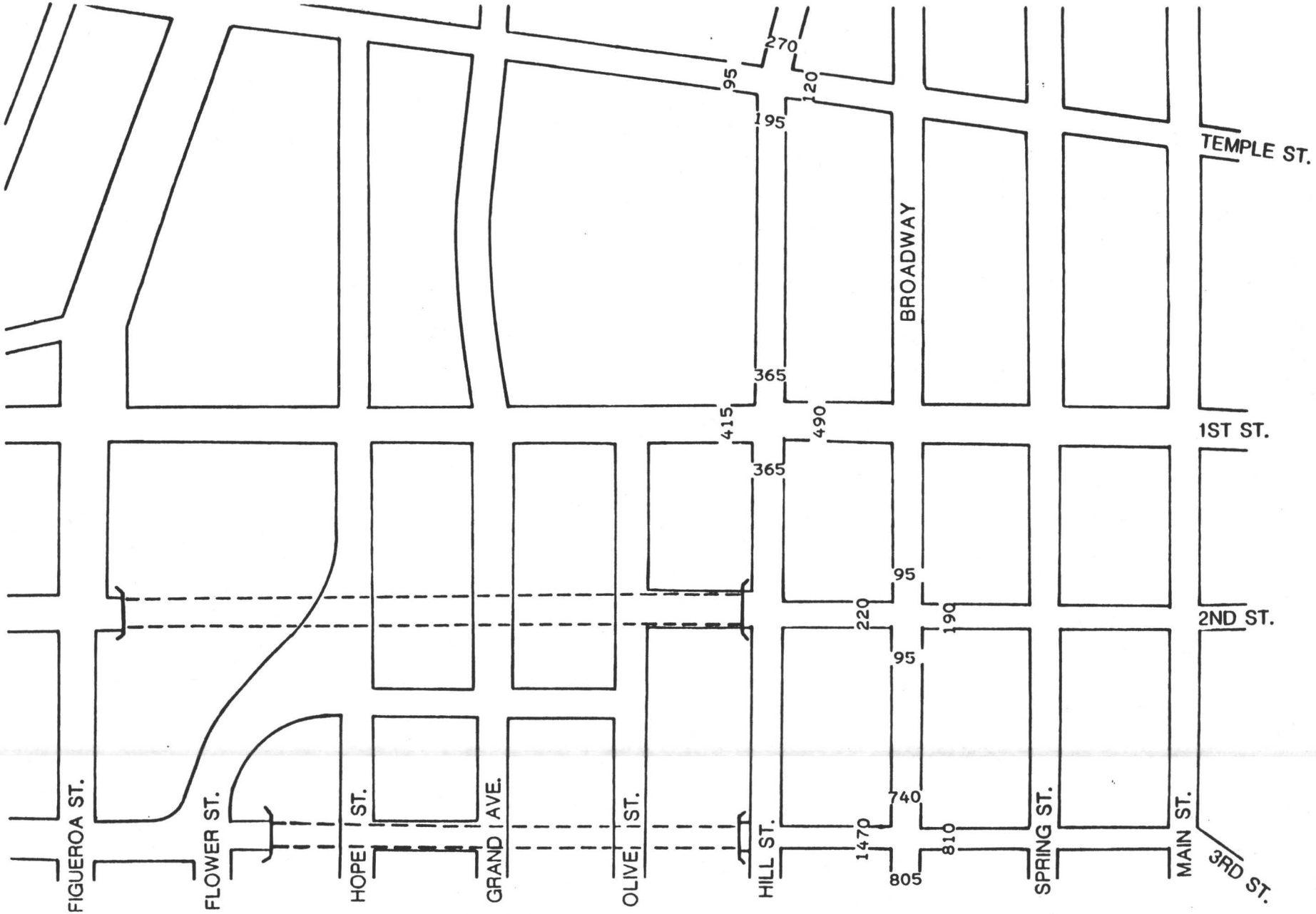
FIGURE 19B



EXISTING PLUS FUTURE PROJECTS 1985-1995
P.M. PEAK HOUR MIDBLOCK PEDESTRIAN VOLUMES

BARTON ASCHMAN ASSOCIATES, INC.

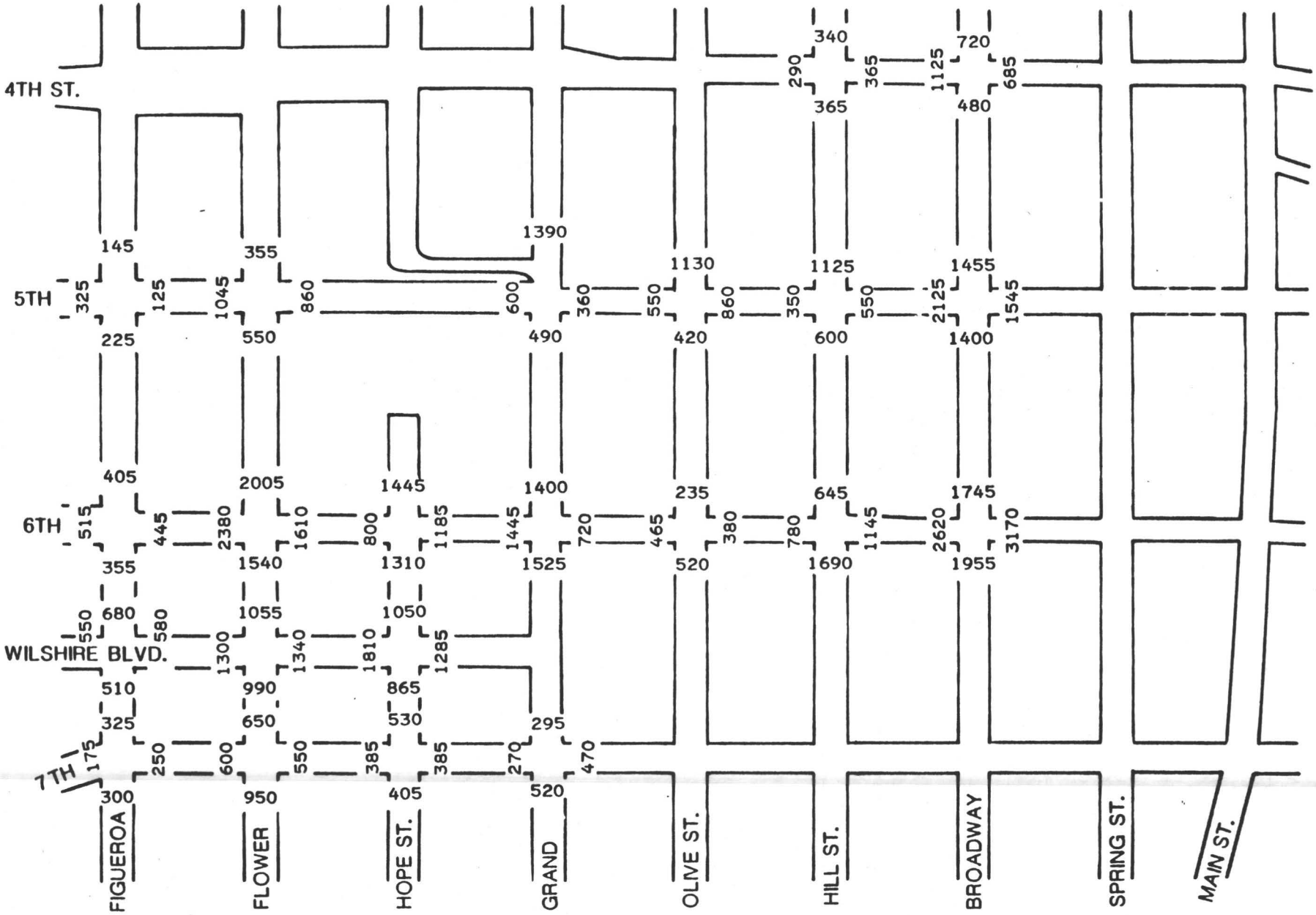
FIGURE 19C



EXISTING PLUS FUTURE PROJECTS 1985–1995
P.M. PEAK HOUR CROSSWALK PEDESTRIAN VOLUMES

BARTON ASCHMAN ASSOCIATES, INC.

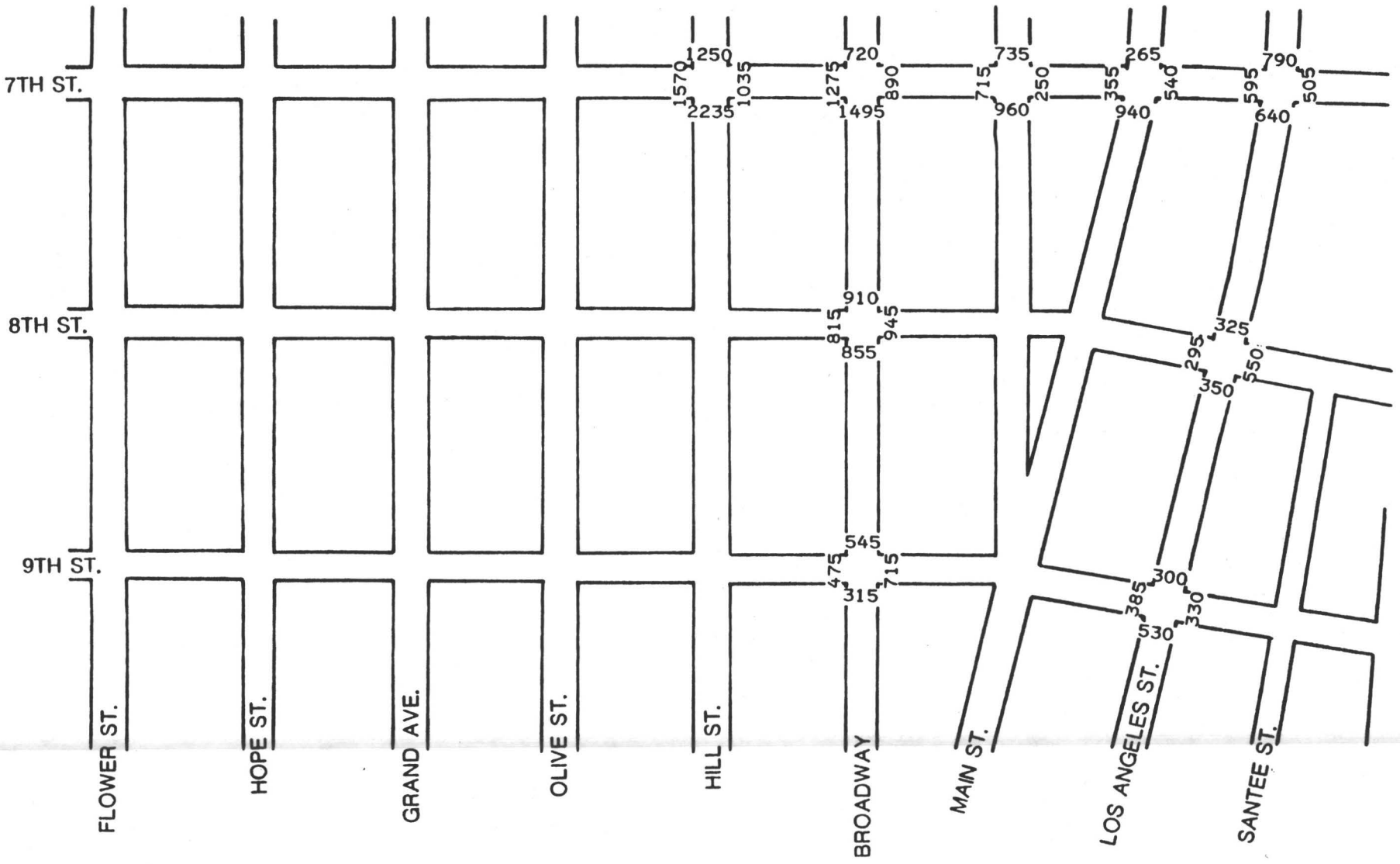
FIGURE
20A



EXISTING PLUS FUTURE PROJECTS 1985-1995
P.M. PEAK HOUR CROSSWALK PEDESTRIAN VOLUMES

BARTON ASCHMAN ASSOCIATES INC.

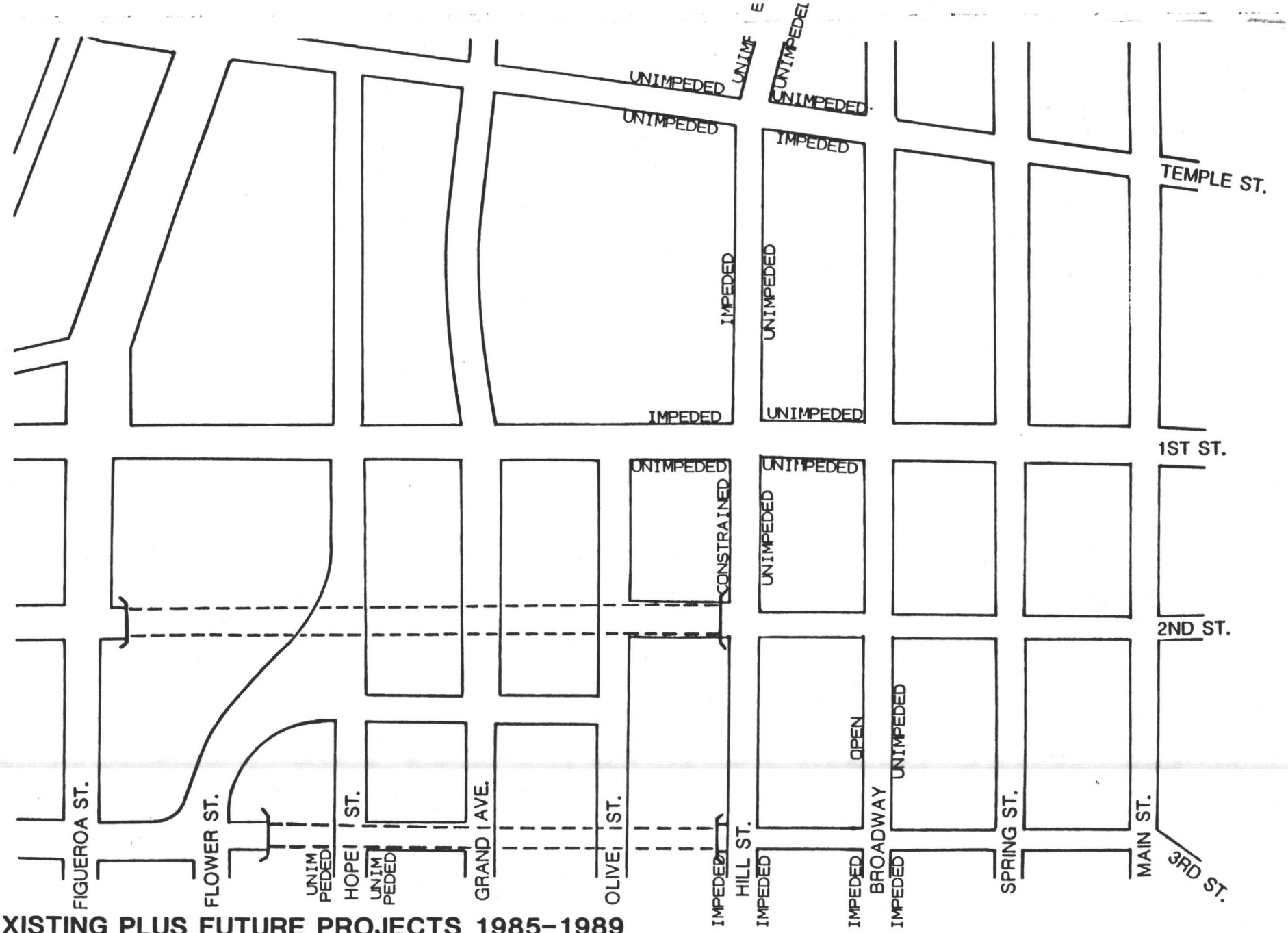
FIGURE 20B



EXISTING PLUS FUTURE PROJECTS 1985-1995
P.M. PEAK HOUR CROSSWALK PEDESTRIAN VOLUMES

BARTON ASCHMAN ASSOCIATES, INC.

FIGURE
20C



EXISTING PLUS FUTURE PROJECTS 1985-1989
MIDDAY PEAK HOUR MIDBLOCK PEDESTRIAN QUALITY OF FLOW

BARTON ASCHMAN ASSOCIATES, INC.

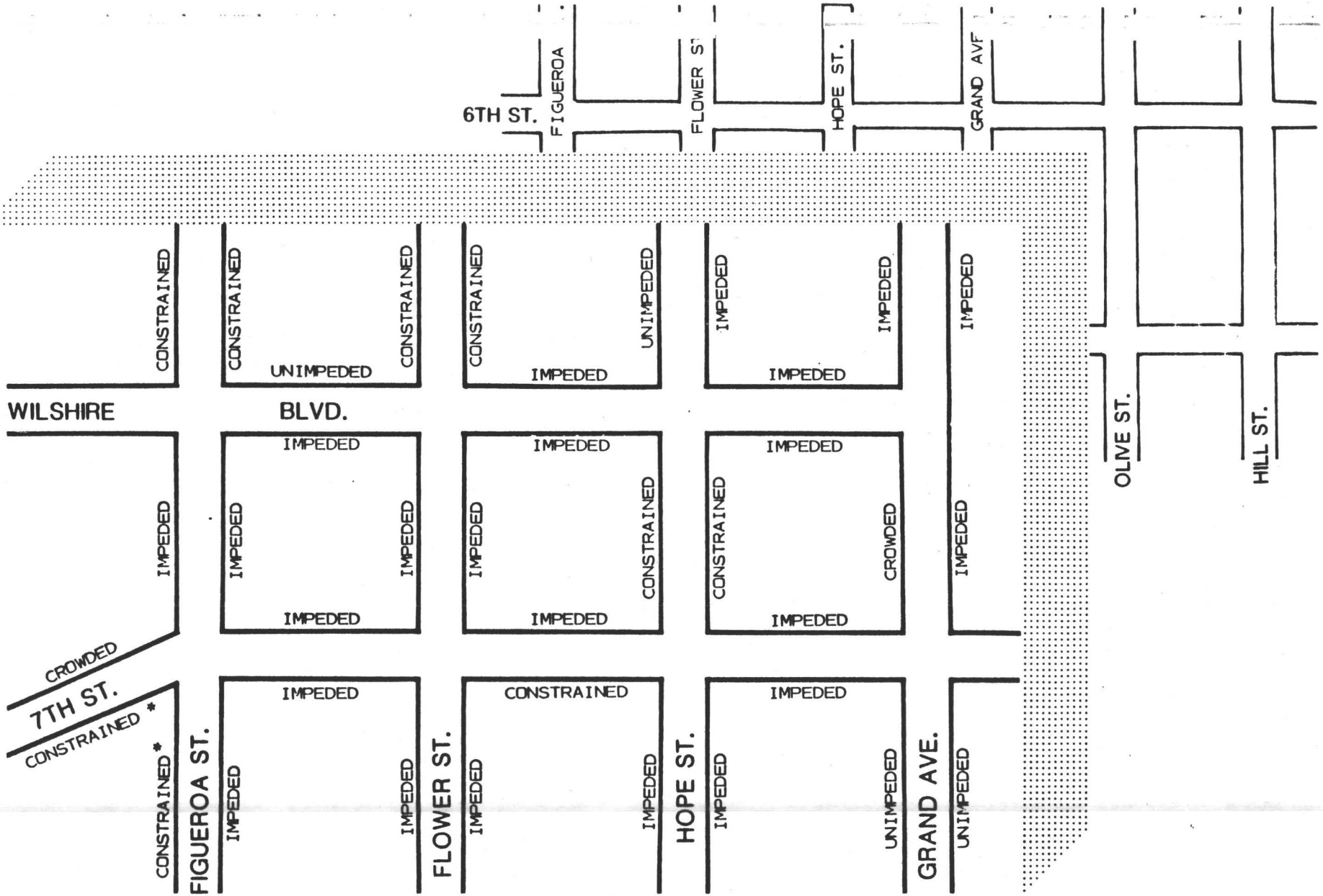
FIGURE
21A

EXISTING PLUS FUTURE PROJECTS 1985-1989
MIDDAY PEAK HOUR MIDBLOCK PEDESTRIAN QUALITY OF FLOW

BARTON ASCHMAN ASSOCIATES, INC.

LEGEND: * ADJUSTED TO REFLECT CURRENT CONSTRUCTION

FIGURE 21B

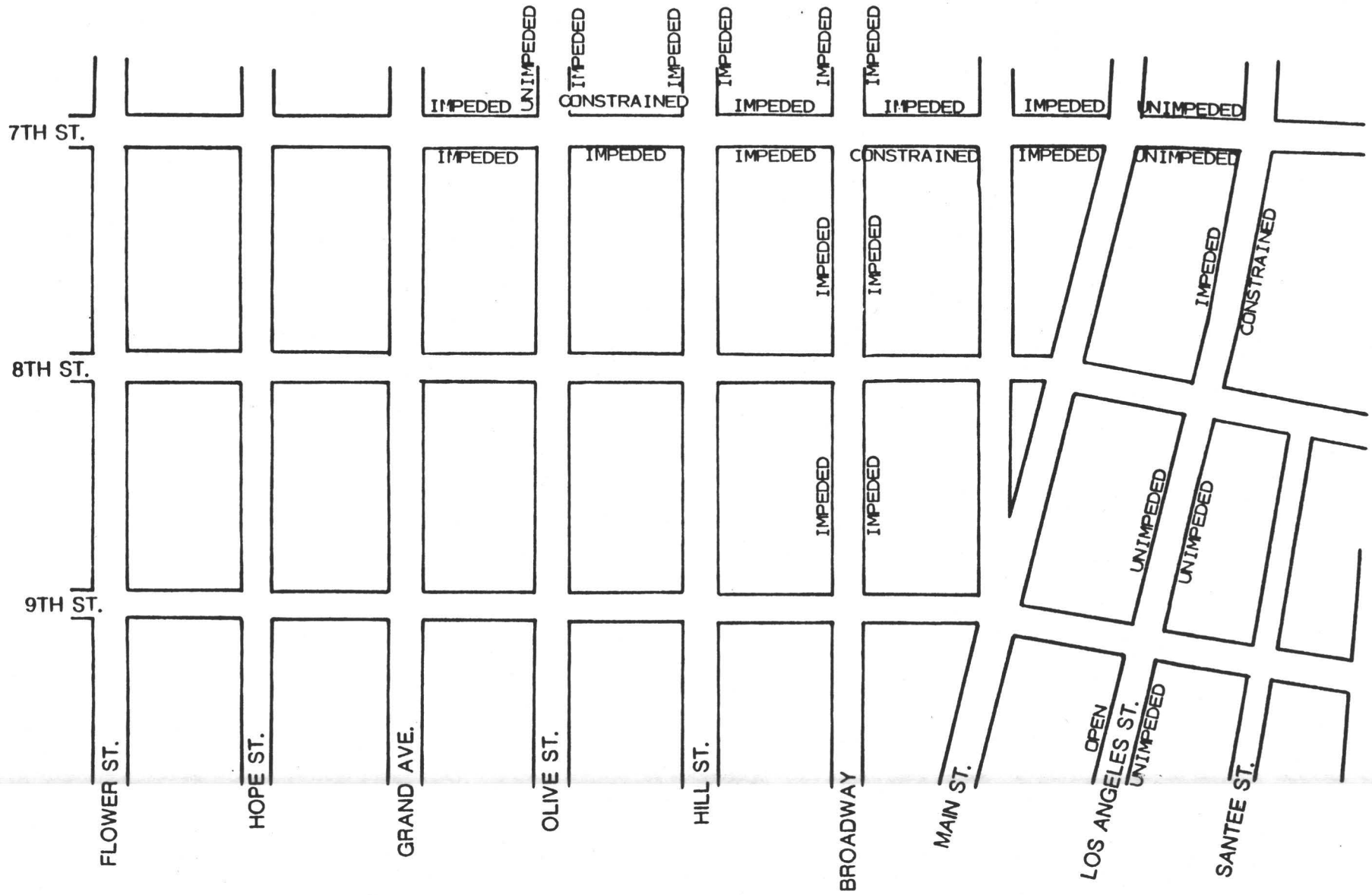


EXISTING PLUS FUTURE PROJECTS 1985-1989
MIDDAY PEAK HOUR MIDBLOCK PEDESTRIAN QUALITY OF FLOW

BARTON ASCHMAN ASSOCIATES, INC.

LEGEND: *ADJUSTED TO REFLECT CURRENT CONSTRUCTION

FIGURE 21C



EXISTING PLUS FUTURE PROJECTS 1985-1989
MIDDAY PEAK HOUR MIDBLOCK PEDESTRIAN QUALITY OF FLOW

BARTON ASCHMAN ASSOCIATES, INC.

FIGURE
21D

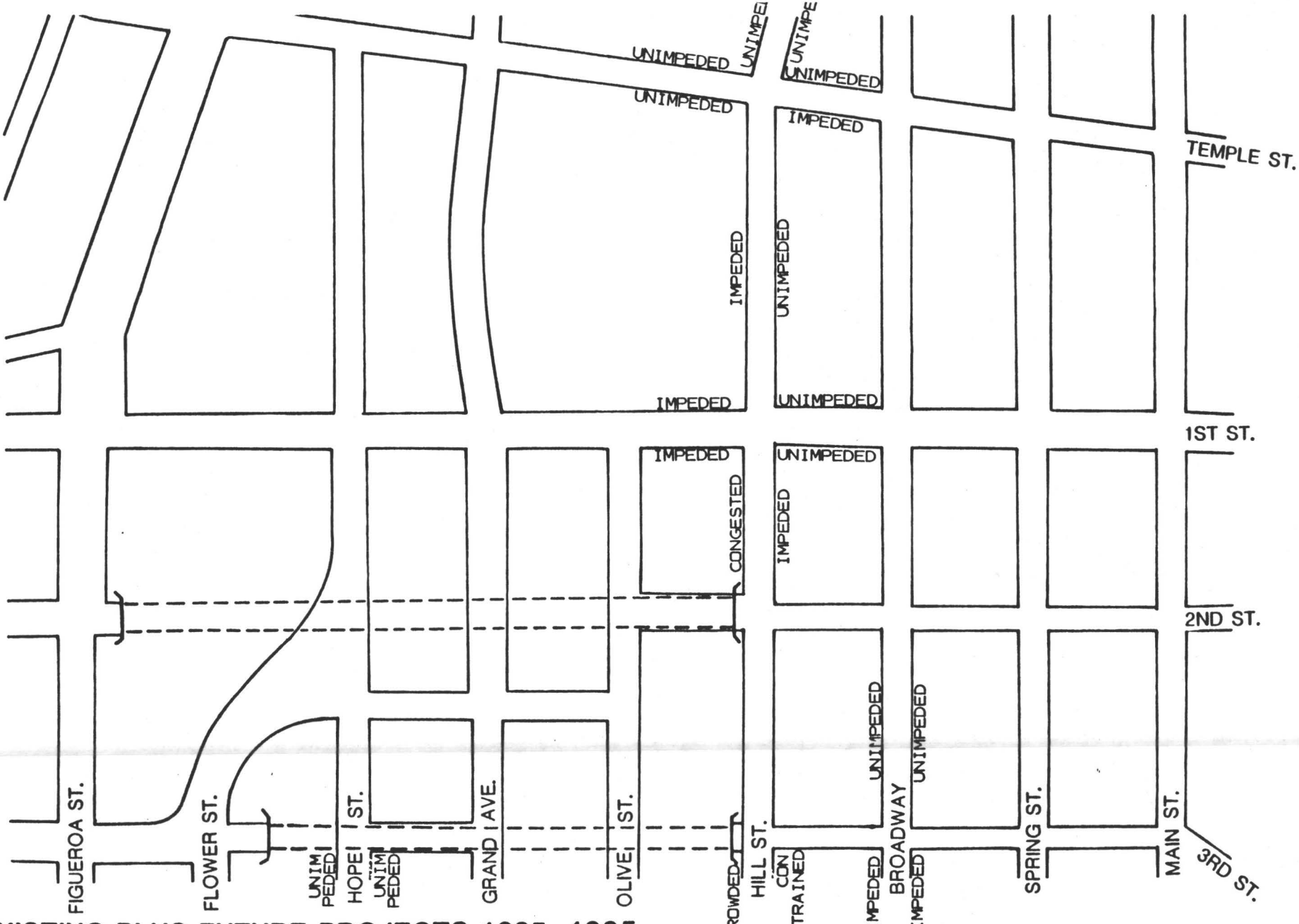
midday peak-hour quality of flow at each of the midblock locations for existing plus 1995 future developments is shown in Figures 22A - 22D.

The midblock quality of flow results in the PM peak hour for both existing plus 1989 future developments and existing plus 1995 future projects are shown in Figures 23A - 23D and 24A - 24D, respectively.

During the midday peak hour, there is a decline in the quality of flow levels at midblock locations near the Metro Rail station areas with the addition of 1989 future developments. In the vicinity of the Civic Center Metro Rail station area, the quality of flow ranges decrease from open-impeded to unimpeded-constrained conditions. Within the Hill Street station area, the quality of flow ranges change from open-impeded to unimpeded-jammed. The quality of flow ranges in the vicinity of the Seventh Street Metro Rail station area decline from unimpeded-impeded to impeded-crowded conditions. Overall, most of the midblock locations are functioning with impeded conditions.

After the addition of 1995 future developments, there are few changes in the quality of flow levels at midblock locations within the study area. There is only one midblock location where the pedestrian flow declines to congested conditions. This location is on the west side of Hill Street between First and Second Streets. Several other locations decline to constrained or crowded conditions.

In the evening peak hour, the quality of flow levels decrease at midblock locations with the construction of 1989 future projects. In the vicinity of the Civic Center Metro Rail station area, there is a decrease from the previous quality of flow range of open-impeded conditions to unimpeded-constrained conditions.



EXISTING PLUS FUTURE PROJECTS 1985-1995
MIDDAY PEAK HOUR MIDBLOCK PEDESTRIAN QUALITY OF FLOW

BARTON ASCHMAN ASSOCIATES, INC.

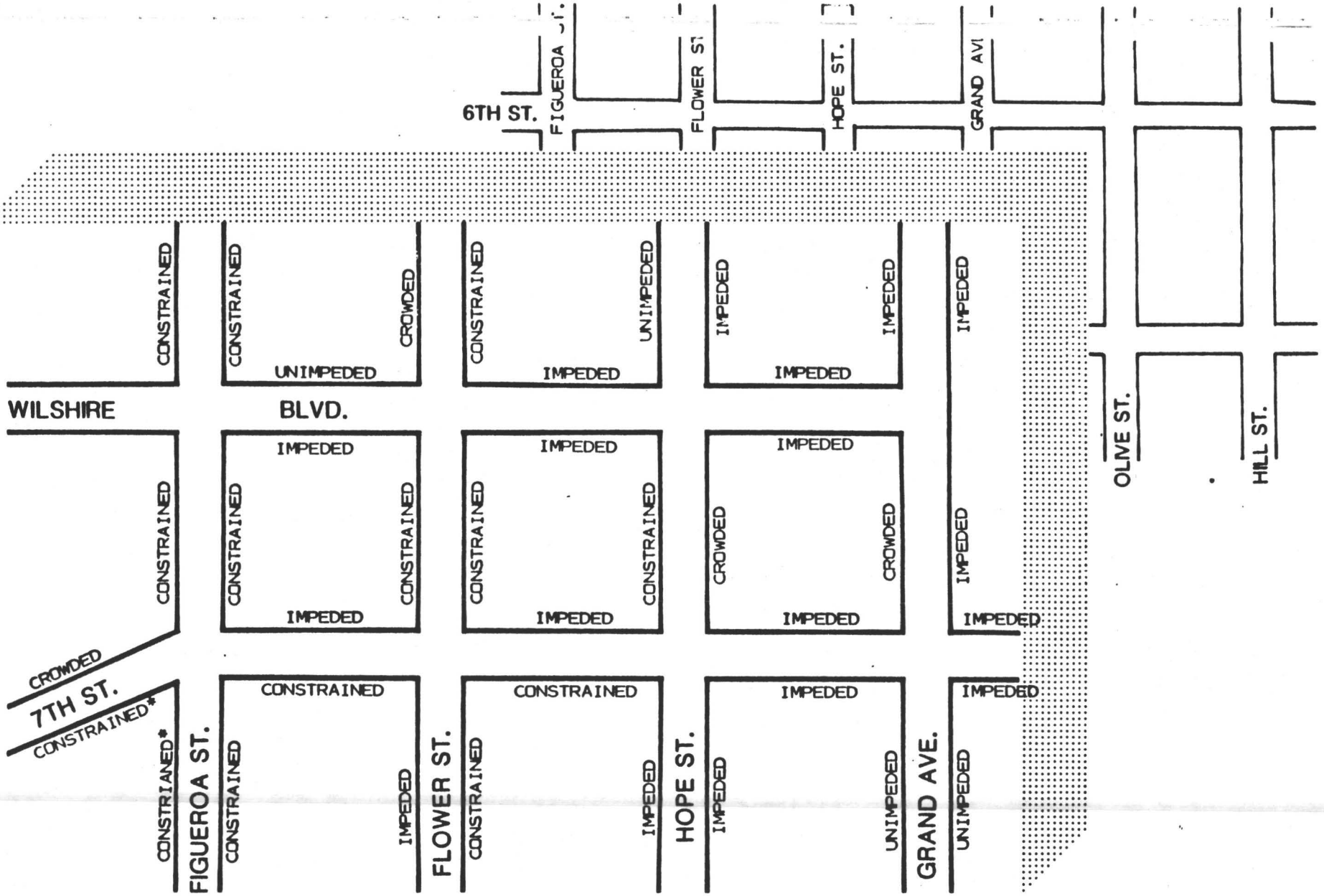
FIGURE
22A

EXISTING PLUS FUTURE PROJECTS 1985-1995
MIDDAY PEAK HOUR MIDBLOCK PEDESTRIAN QUALITY OF FLOW

BARTON ASCHMAN ASSOCIATES, INC.

LEGEND: * ADJUSTED TO REFLECT CURRENT CONSTRUCTION

FIGURE 22B

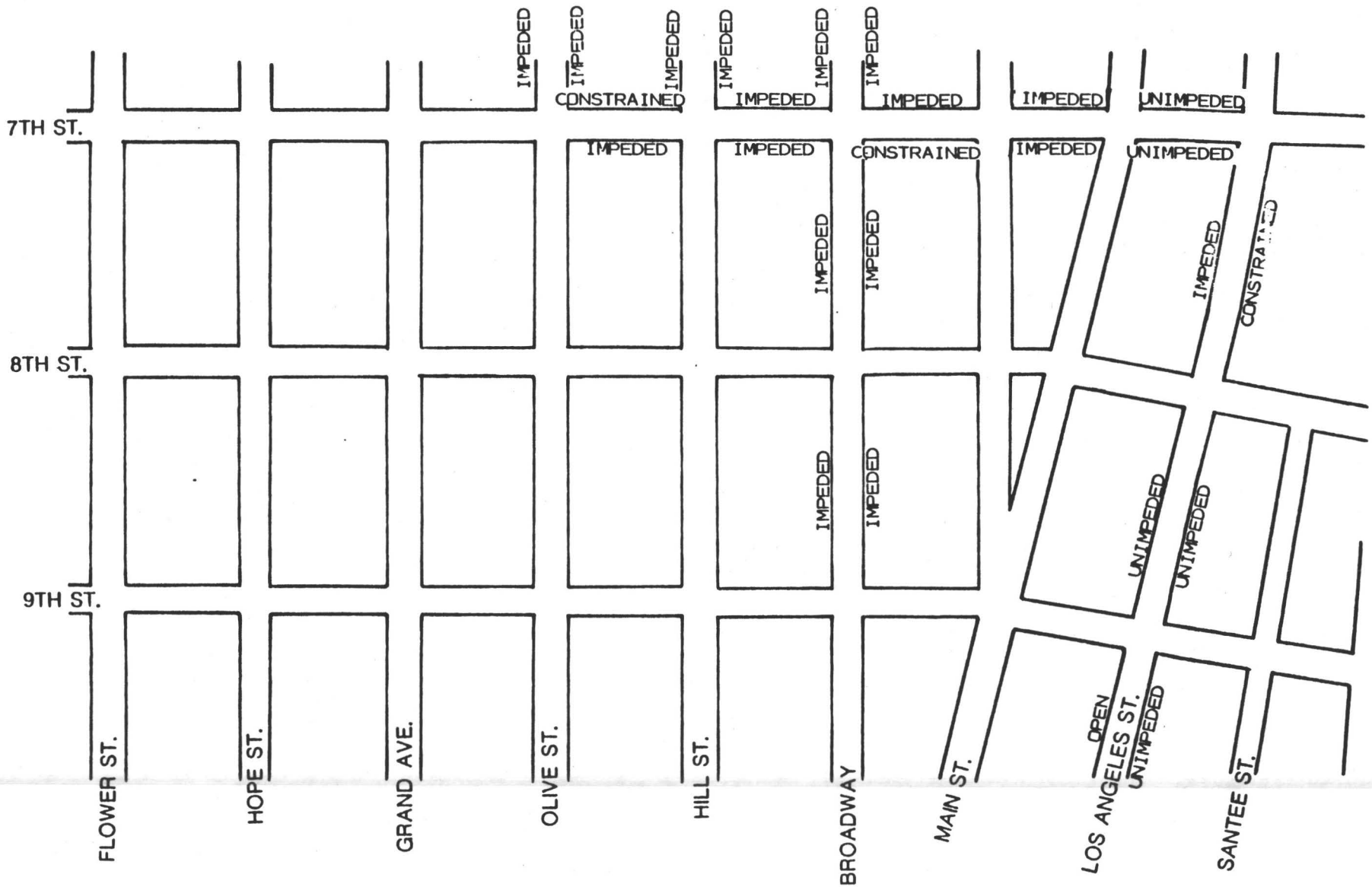


EXISTING PLUS FUTURE PROJECTS 1985-1995
MIDDAY PEAK HOUR MIDBLOCK PEDESTRIAN QUALITY OF FLOW

BARTON ASCHMAN ASSOCIATES, INC.

LEGEND: * ADJUSTED TO REFLECT CURRENT CONSTRUCTION

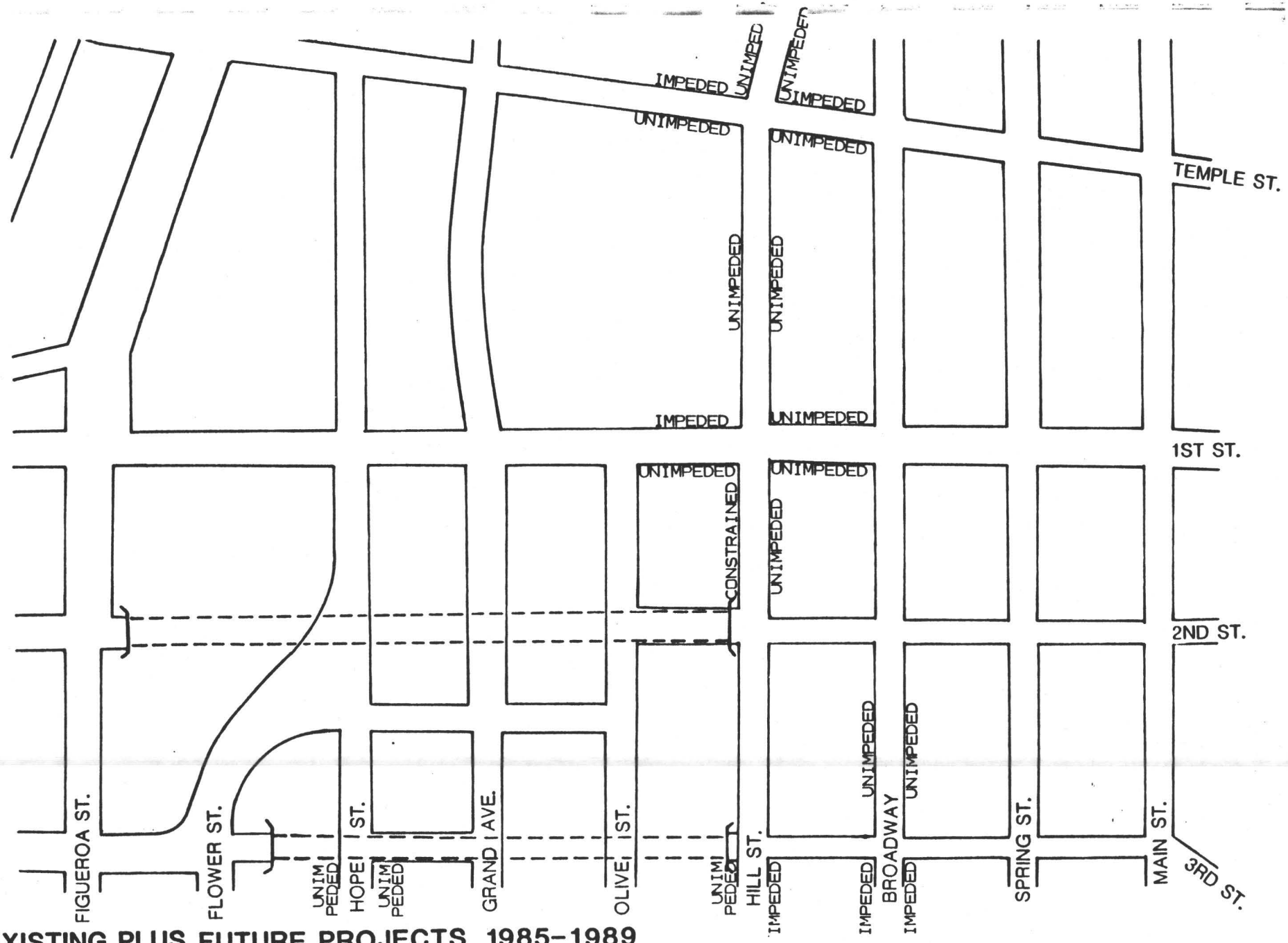
FIGURE 22C



EXISTING PLUS FUTURE PROJECTS 1985-1995
MIDDAY PEAK HOUR MIDBLOCK QUALITY OF FLOW

BARTON ASCHMAN ASSOCIATES, INC.

FIGURE
22D



EXISTING PLUS FUTURE PROJECTS 1985-1989
P.M. PEAK HOUR MIDBLOCK PEDESTRIAN QUALITY OF FLOW

BARTON ASCHMAN ASSOCIATES, INC.

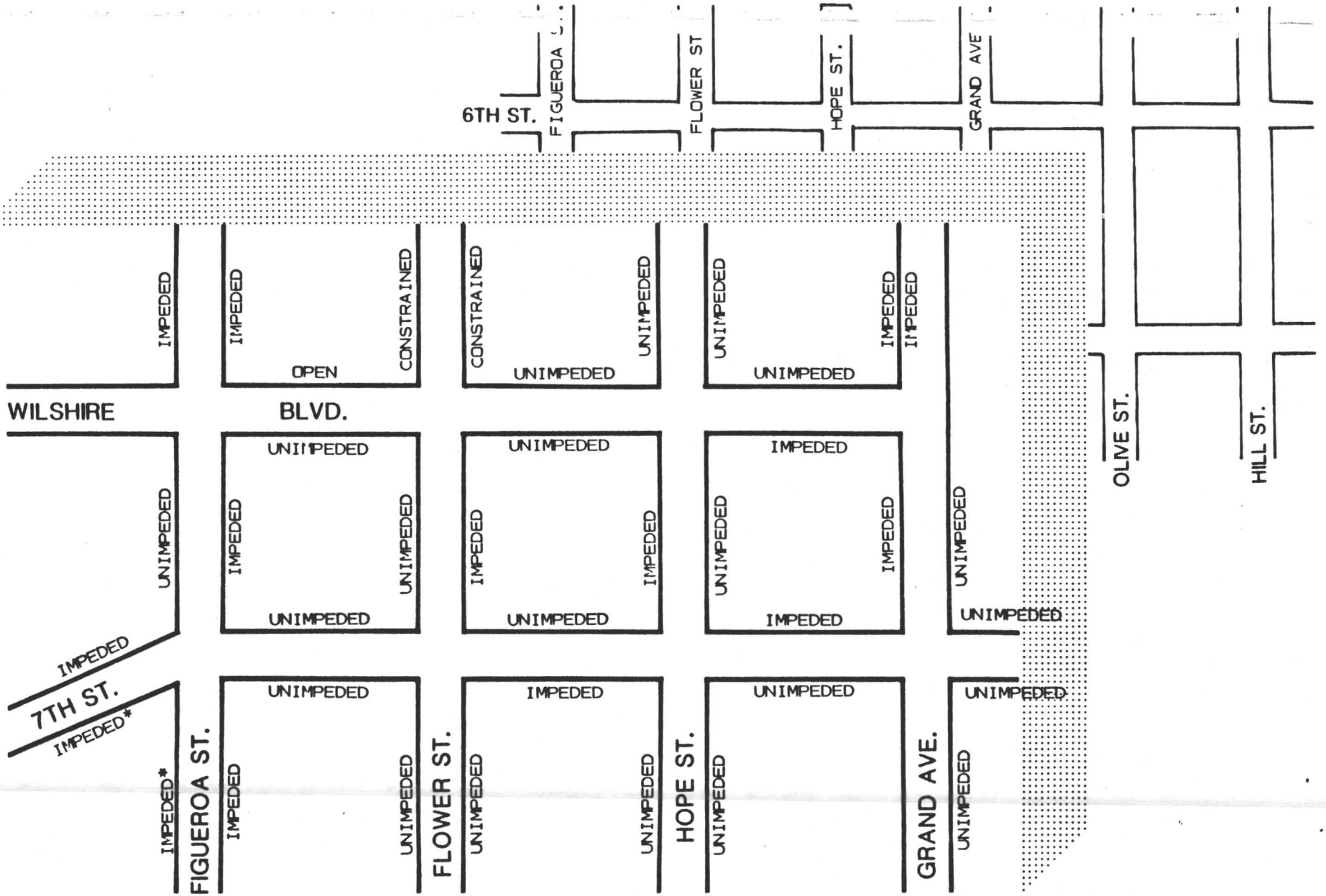
FIGURE
23A

EXISTING PLUS FUTURE PROJECTS 1985-1989
P.M. PEAK HOUR MIDBLOCK PEDESTRIAN QUALITY OF FLOW

BARTON ASCHMAN ASSOCIATES, INC.

LEGEND: * ADJUSTED TO REFLECT CURRENT CONSTRUCTION

FIGURE 23B

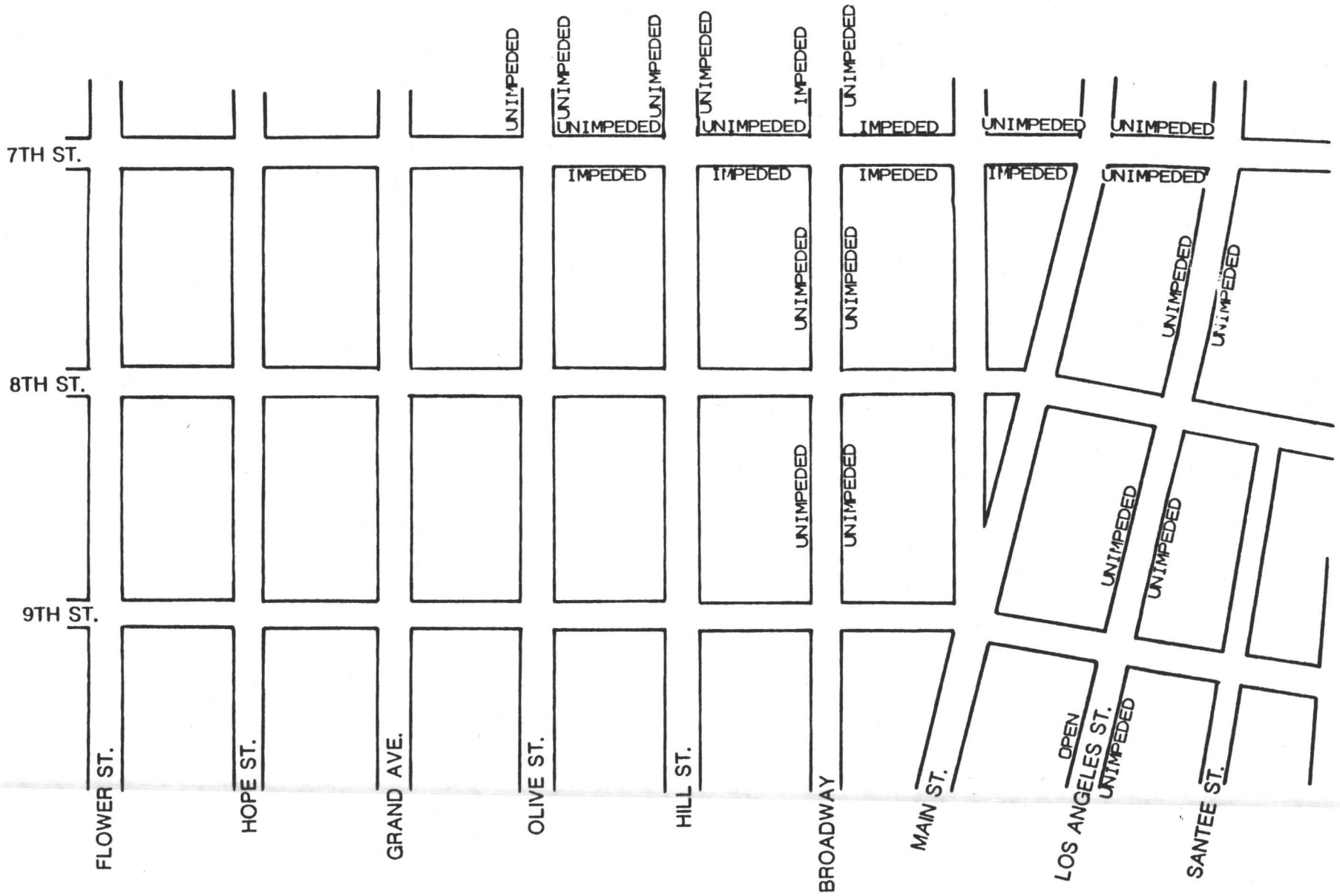


EXISTING PLUS FUTURE PROJECTS 1985-1989
P.M. PEAK HOUR MIDBLOCK PEDESTRIAN QUALITY OF FLOW

BARTON ASCHMAN ASSOCIATES, INC.

LEGEND: *ADJUSTED TO REFLECT CURRENT CONSTRUCTION

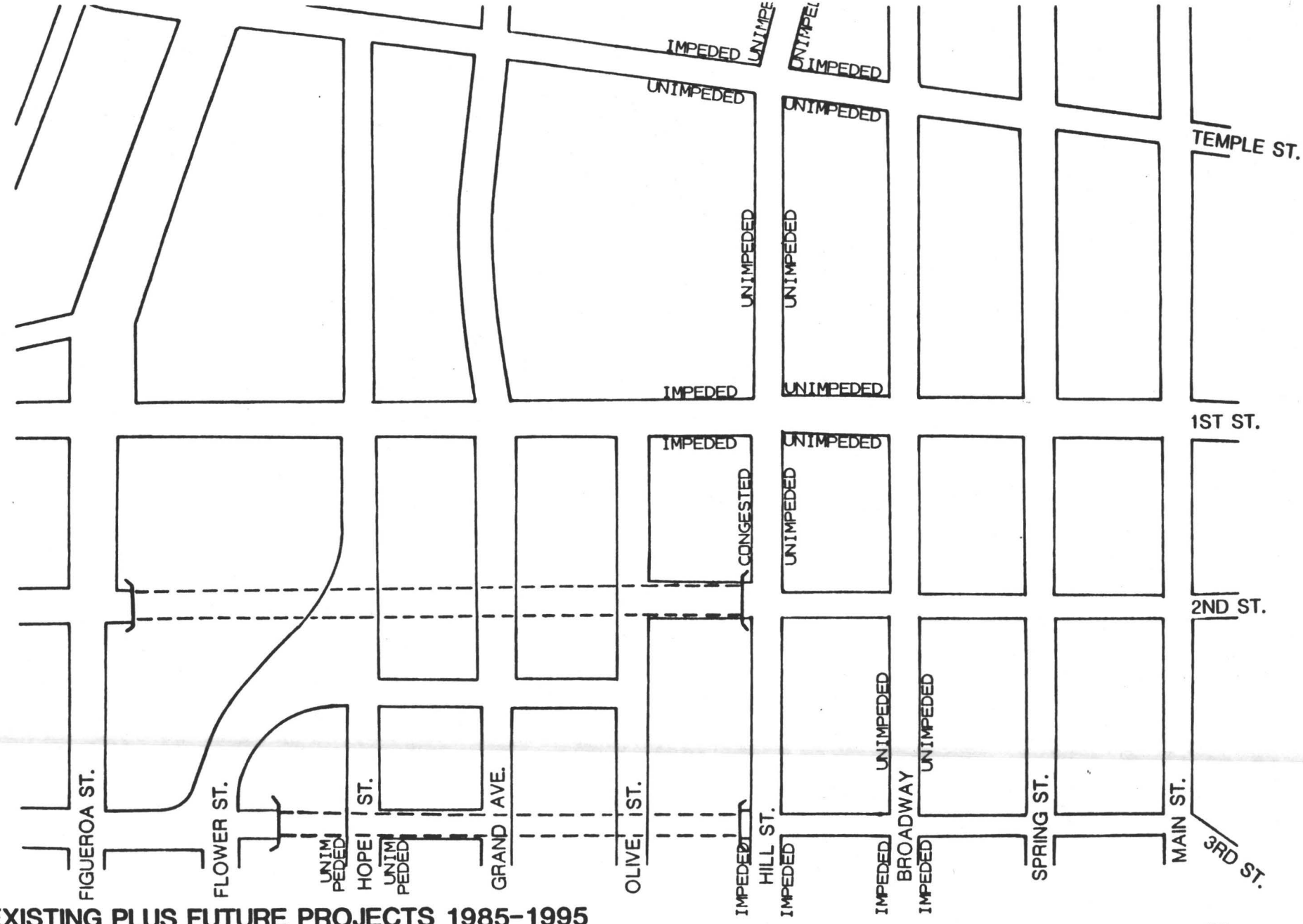
FIGURE 23C



EXISTING PLUS FUTURE PROJECTS 1985-1989
P.M. PEAK HOUR MIDBLOCK QUALITY OF FLOW

BARTON ASCHMAN ASSOCIATES, INC.

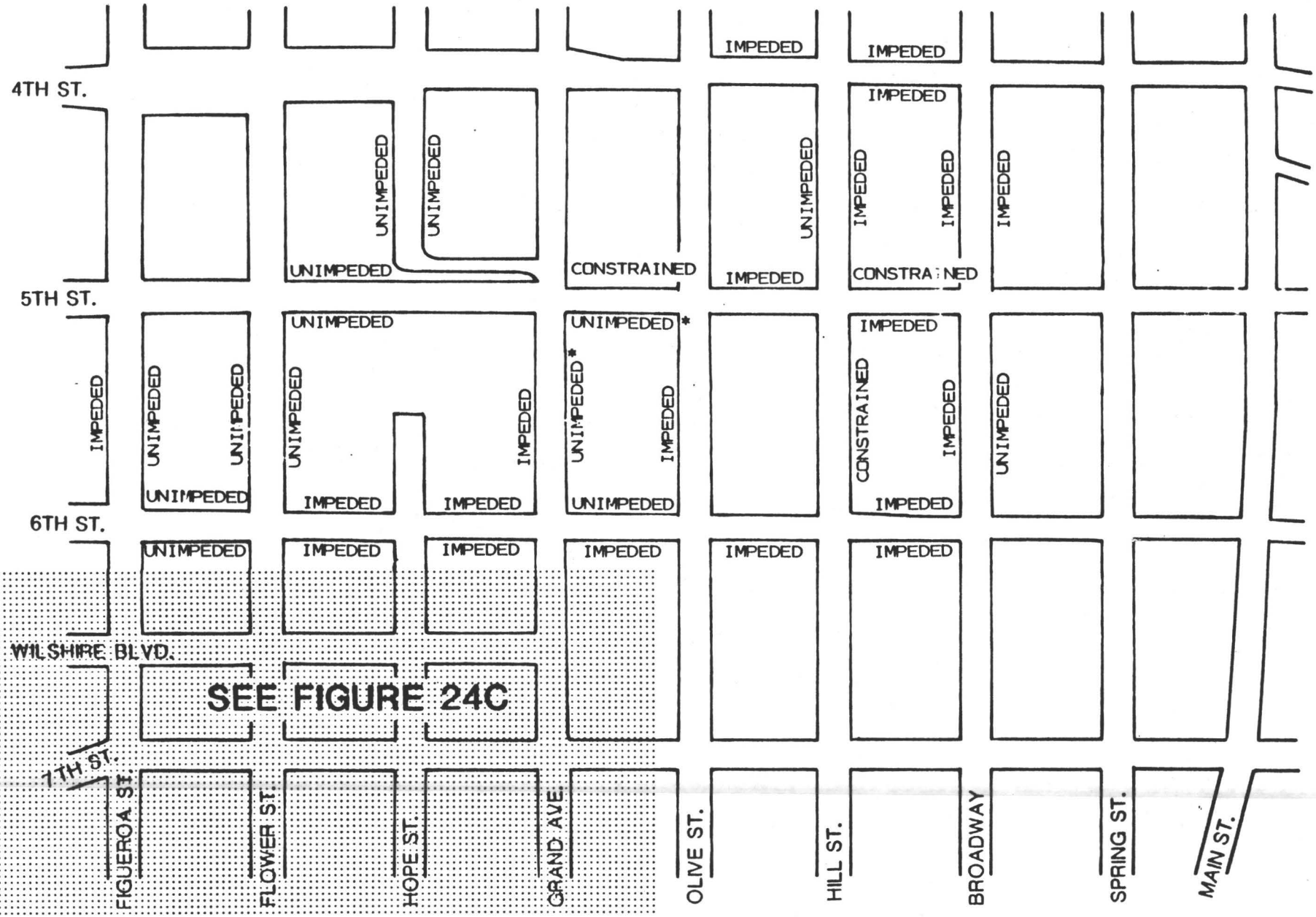
FIGURE 23D



EXISTING PLUS FUTURE PROJECTS 1985-1995
P.M. PEAK HOUR MIDBLOCK PEDESTRIAN QUALITY OF FLOW

BARTON ASCHMAN ASSOCIATES, INC.

FIGURE 24A

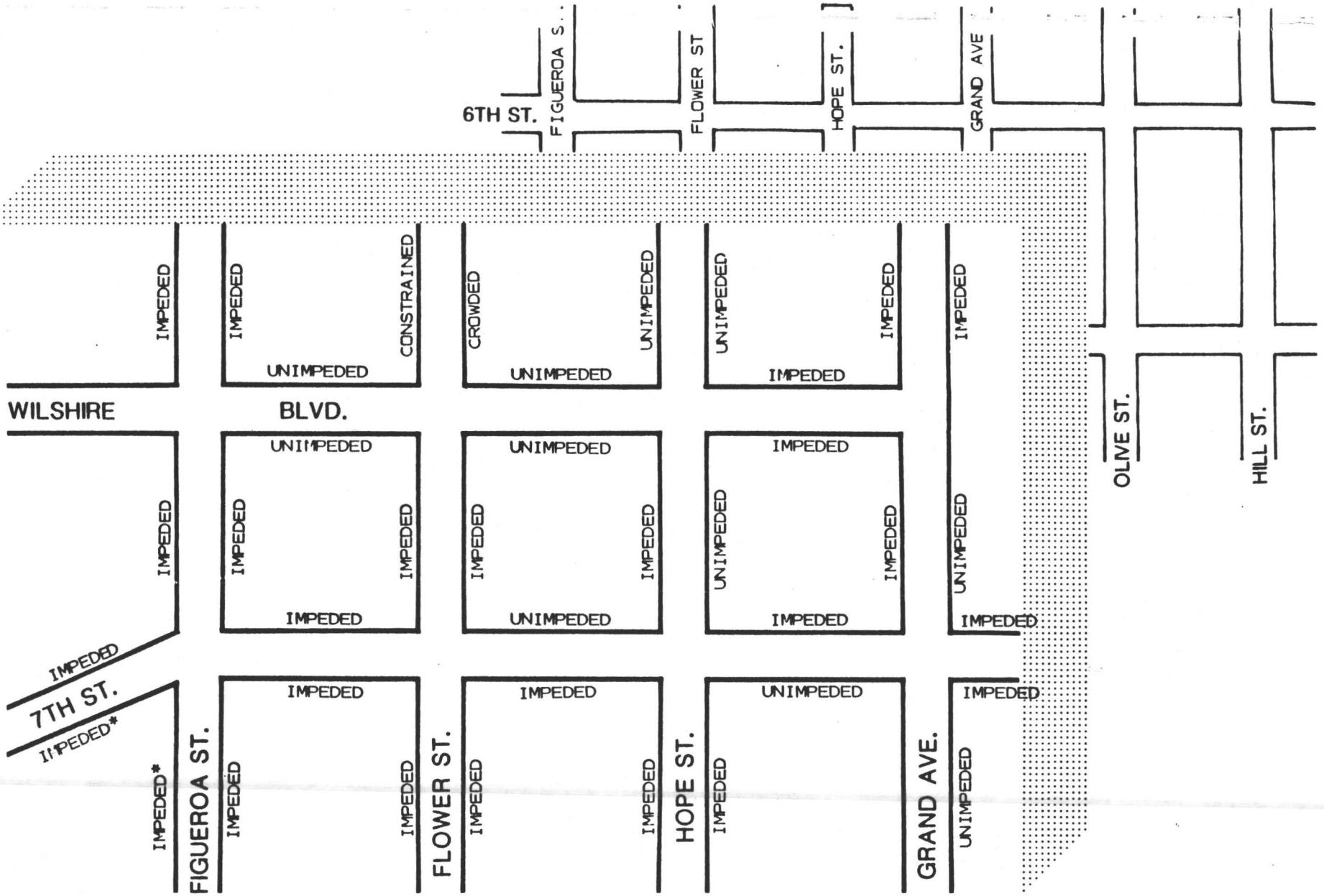


EXISTING PLUS FUTURE PROJECTS 1985-1995
P.M. PEAK HOUR MIDBLOCK PEDESTRIAN QUALITY OF FLOW

BARTON ASCHMAN ASSOCIATES, INC.

LEGEND: *CONSTRUCTION

FIGURE 24B

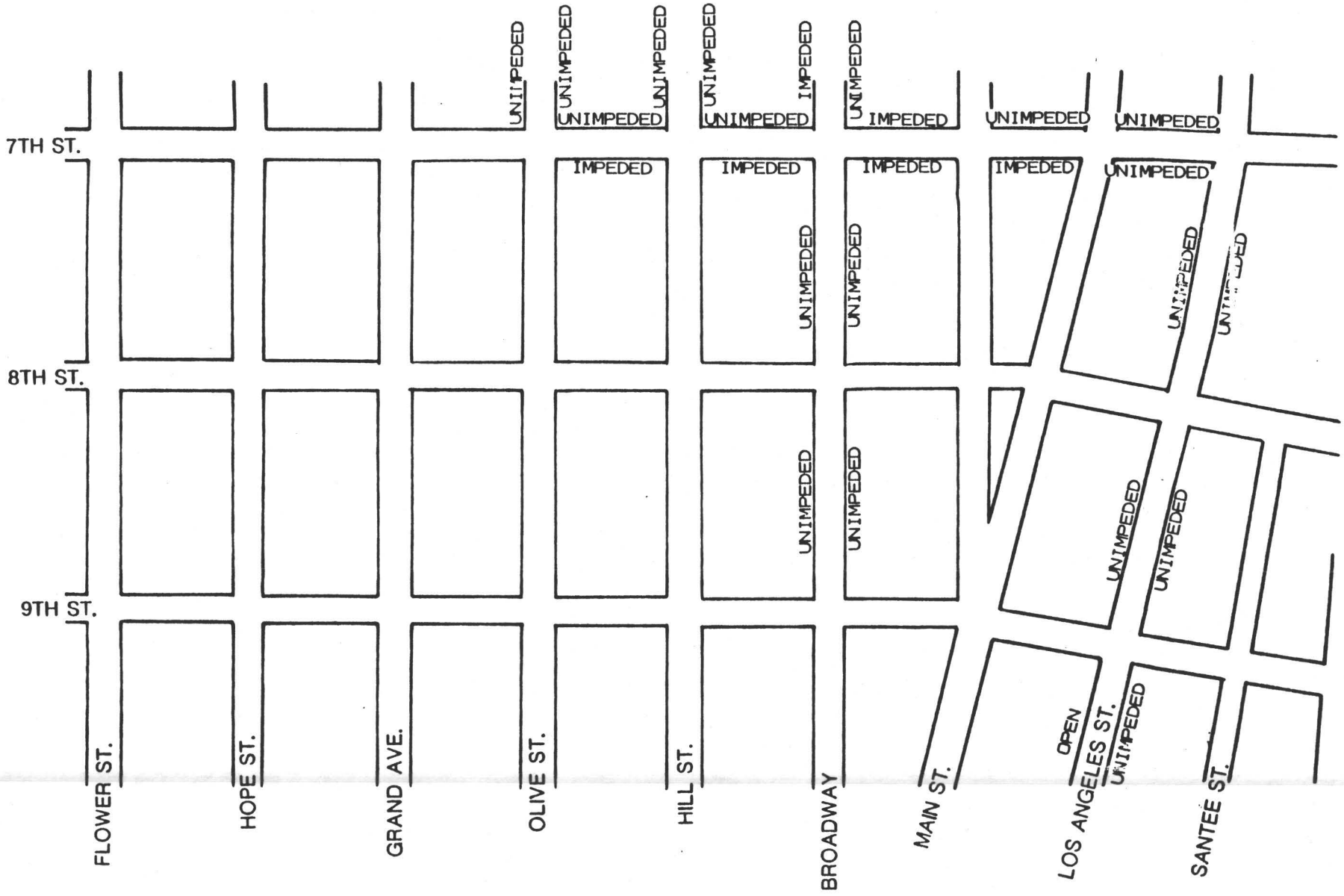


EXISTING PLUS FUTURE PROJECTS 1985-1995
P.M. PEAK HOUR MIDBLOCK PEDESTRIAN QUALITY OF FLOW

BARTON ASCHMAN ASSOCIATES, INC.

LEGEND: *ADJUSTED TO REFLECT CURRENT CONSTRUCTION

FIGURE 24C



EXISTING PLUS FUTURE PROJECTS 1985-1995
P.M. PEAK HOUR MIDBLOCK QUALITY OF FLOW

BARTON ASCHMAN ASSOCIATES, INC.

FIGURE 24D

There is also a considerable decline in the quality of flow levels near the Hill Street Metro Rail station area. At this location, the quality of flow level range changes from open-impeded to unimpeded-constrained conditions.

Overall, most of the midblock locations function with unimpeded or impeded conditions.

With the addition of 1995 future developments, there are very few dramatic changes in the quality of flow at the midblock locations within the study area. At the majority of the midblock locations, the quality of flow is impeded.

A number of potential problem areas become apparent, however. These are locations at which the quality of flow will fall below impeded (the design level, as described earlier). The specific areas of concern are as follows:

- Hill Street between First and Second Streets and between Third and Fourth Streets;
- Fifth Street between Grand Avenue and Broadway;
- North-south streets from Grand Avenue to Broadway between Fifth Street and Sixth Street;
- Sixth Street between Hope Street and Broadway;
- Figueroa Street between Sixth and Eighth Streets;
- Flower Street between Sixth and Eighth Streets;

- Hope Street between Wilshire Boulevard and Seventh Street; and

- Seventh Street between Figueroa and Hope Streets.

FUTURE PEDESTRIAN CROSSWALK FLOW ANALYSIS

The future pedestrian crosswalk flow volumes were analyzed by first determining the peak 15-minute pedestrian volume at each of the crosswalk locations. Next, each peak 15-minute pedestrian volume was factored up by the ratio of total signal time to cross time minus three seconds.(1)

The adjusted volume was used in conjunction with Table 2 to determine the quality of flow for each crosswalk location.

The midday peak-hour quality of flow at each of the crosswalk locations for existing plus 1989 future developments is shown in Figures 25A - 25D. The existing plus 1995 future development midday peak-hour crosswalk quality of flow levels are summarized in Figures 26A - 26D.

Figures 27A - 27D illustrate the results of the crosswalk quality of flow calculations in the PM peak hour for existing plus 1989 future developments.

The PM peak-hour crosswalk quality of flow analysis for existing plus 1995 future projects is shown in Figures 28A - 28D.

During the midday peak hour, the quality of flow declines at many crosswalk locations with the addition of the 1989 future projects. Along Sixth Street and Broadway Street, many crosswalks will be functioning at congested or

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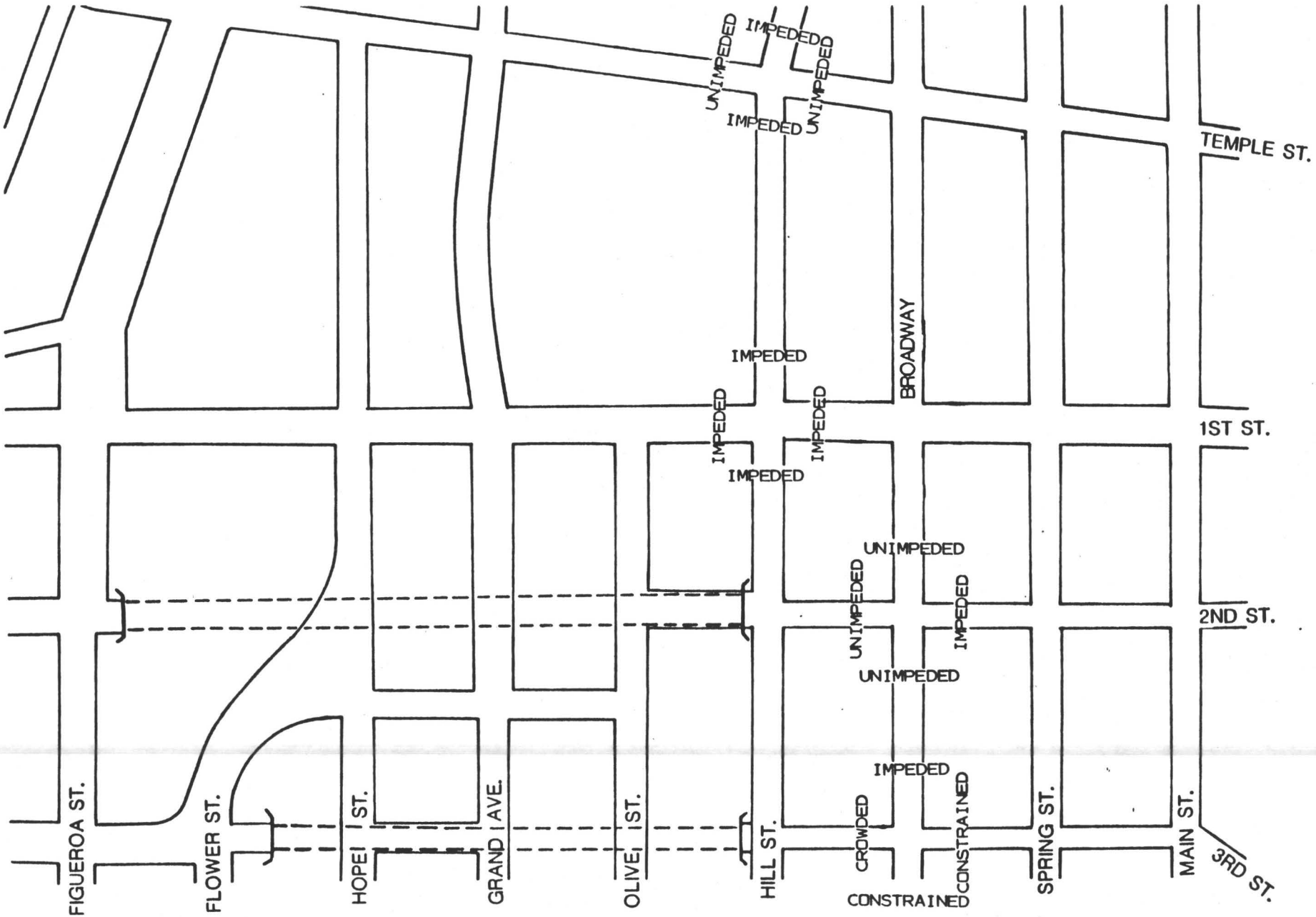
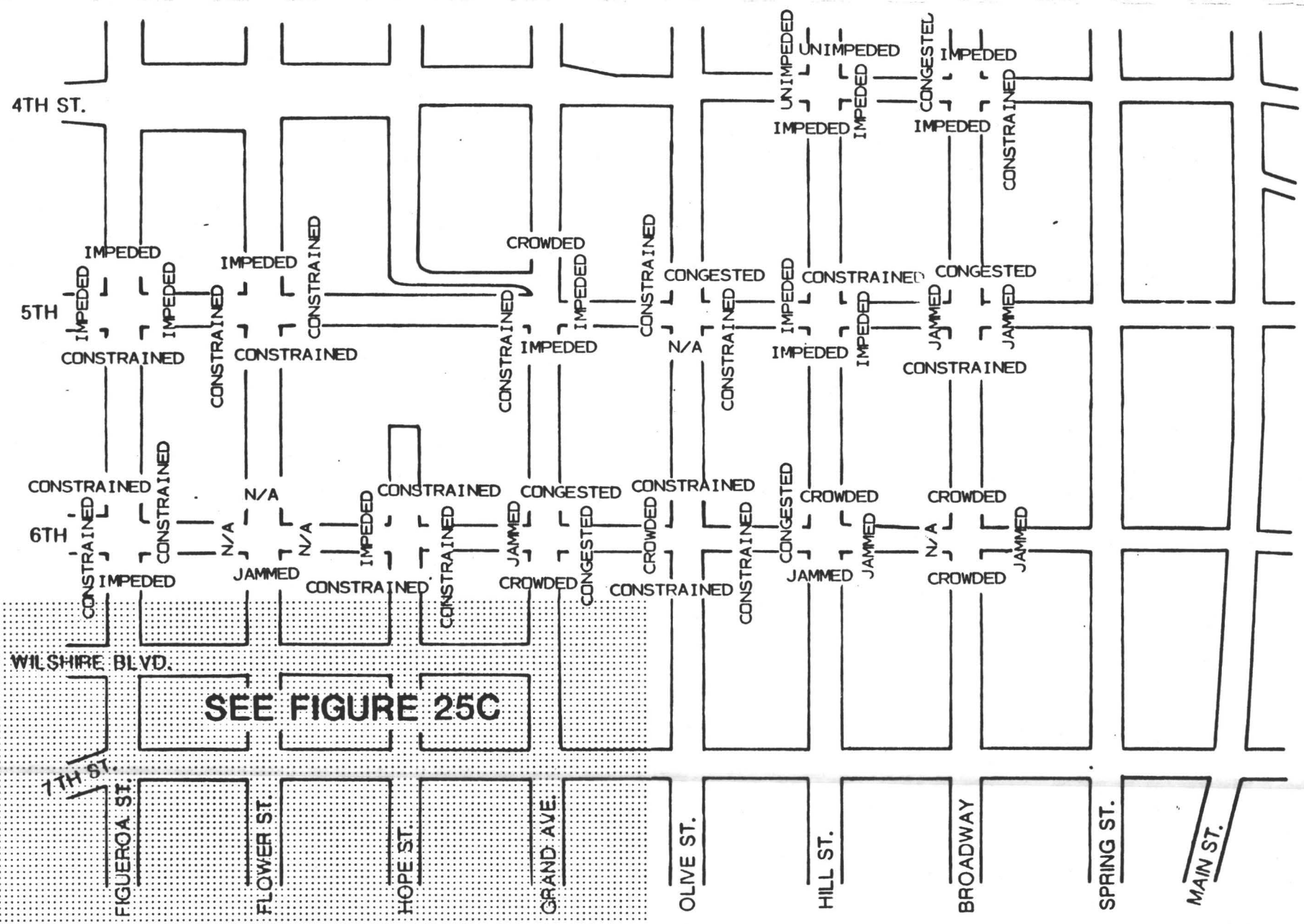
(1) This methodology is discussed in more detail in Chapter 2.



EXISTING PLUS FUTURE PROJECTS 1985 –1989
MIDDAY PEAK HOUR CROSSWALK PEDESTRIAN QUALITY OF FLOW

BARTON ASCHMAN ASSOCIATES, INC.

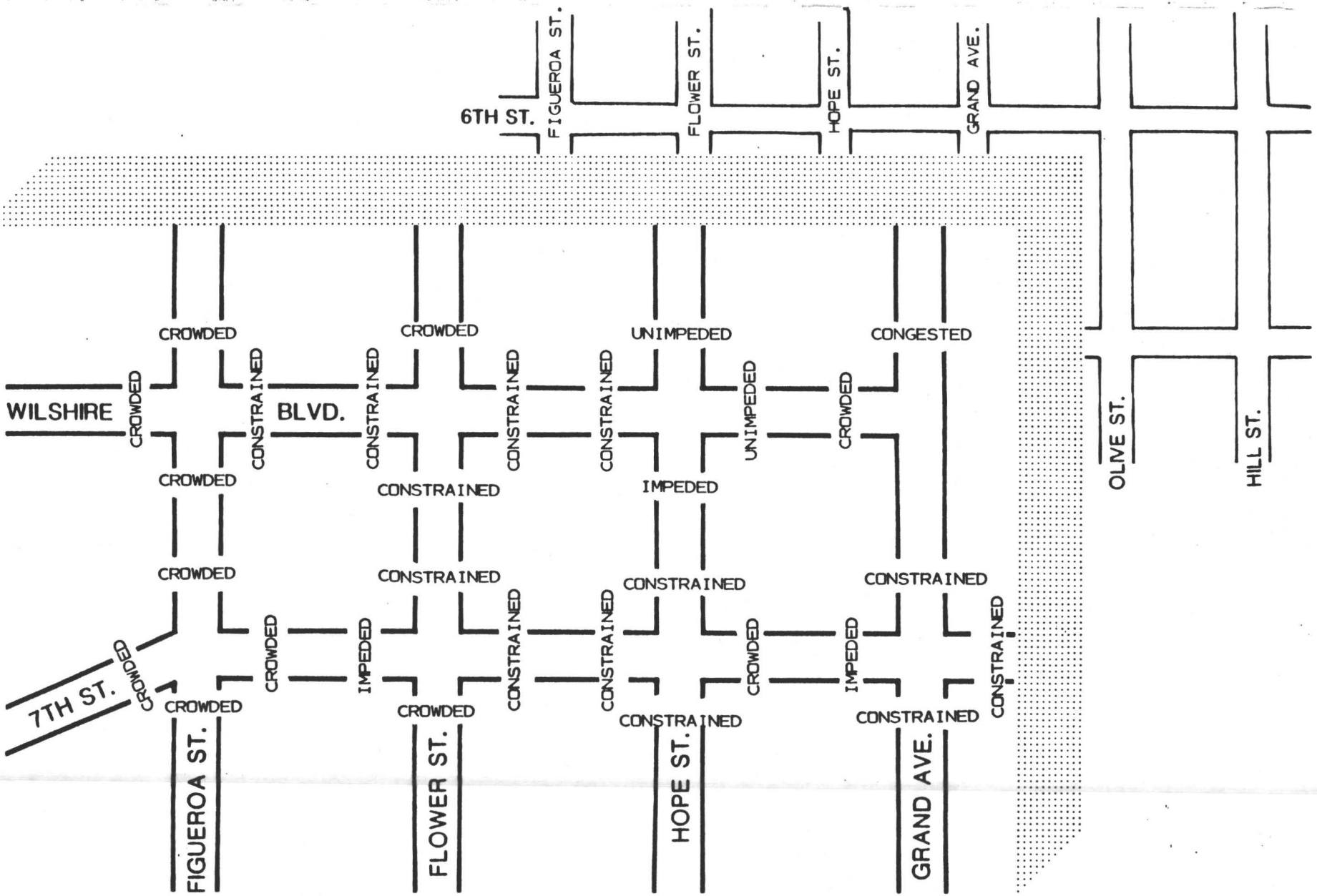
FIGURE 25A



EXISTING PLUS FUTURE PROJECTS 1985-1989
MIDDAY PEAK HOUR CROSSWALK PEDESTRIAN QUALITY OF FLOW

BARTON ASCHMAN ASSOCIATES, INC.

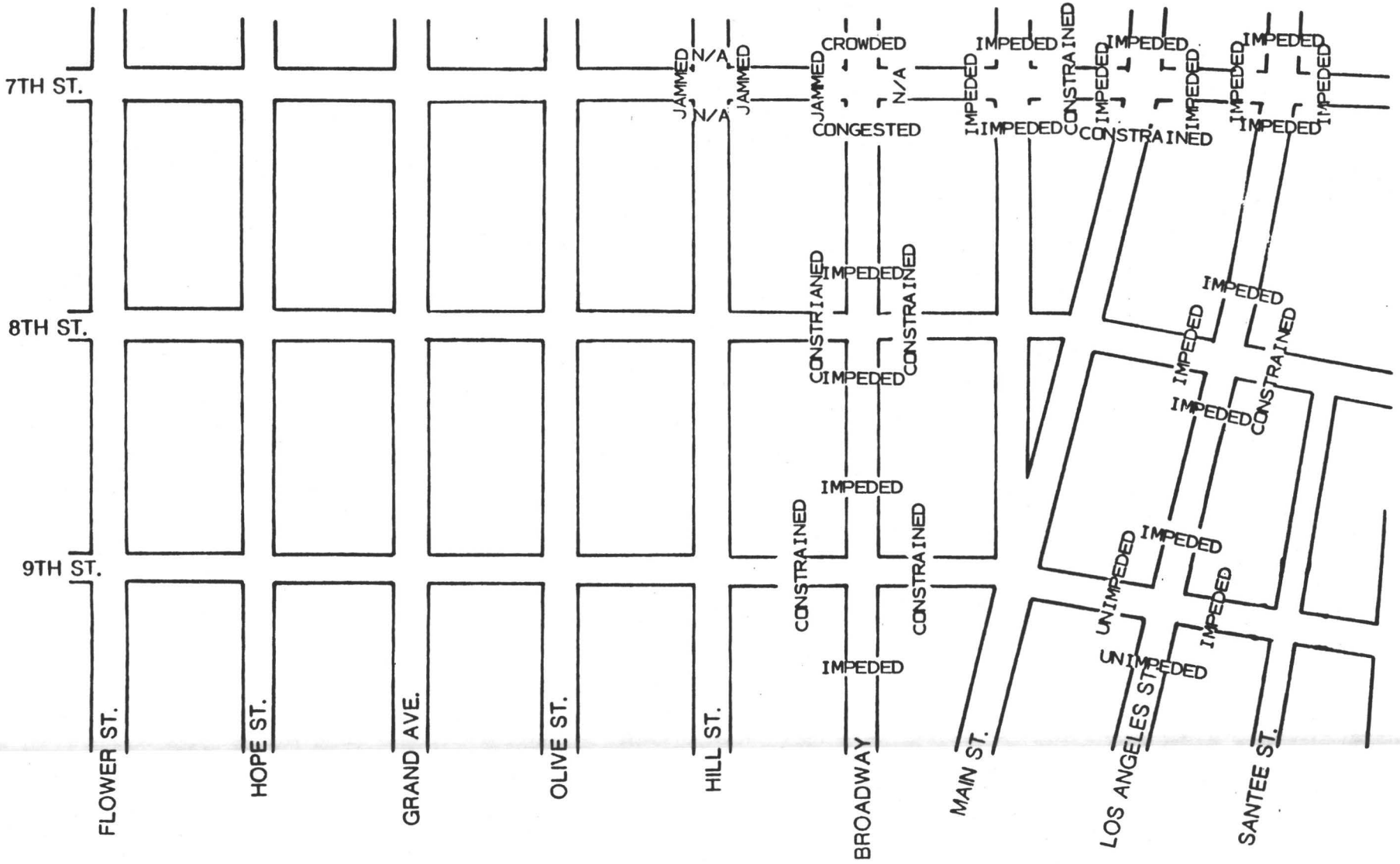
FIGURE 25B



EXISTING PLUS FUTURE PROJECTS 1985–1989
MIDDAY PEAK HOUR CROSSWALK PEDESTRIAN QUALITY OF FLOW

BARTON ASCHMAN ASSOCIATES INC.

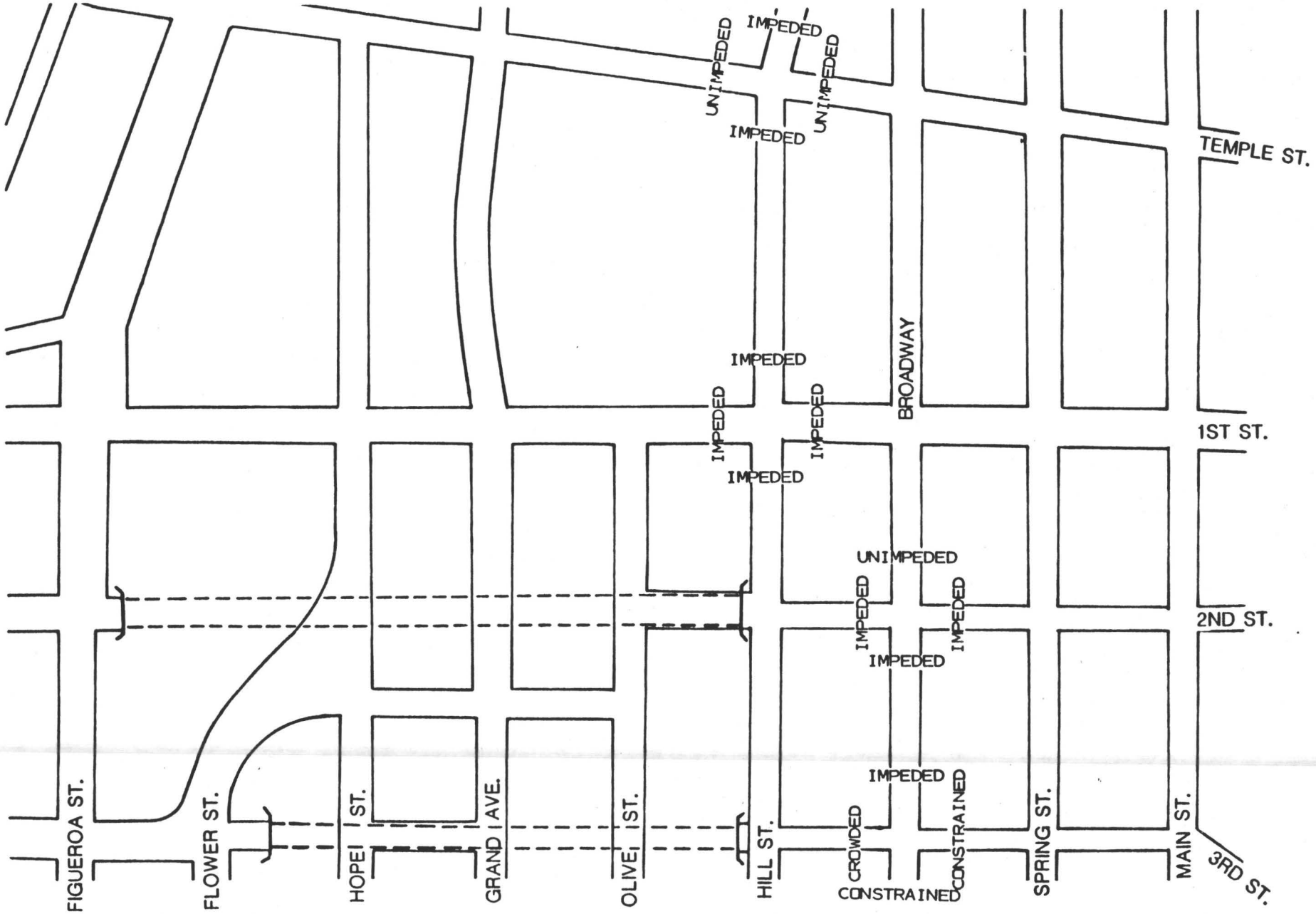
FIGURE
25C



EXISTING PLUS FUTURE PROJECTS 1985–1989
MIDDAY PEAK HOUR CROSSWALK QUALITY OF FLOW

BARTON ASCHMAN ASSOCIATES, INC.

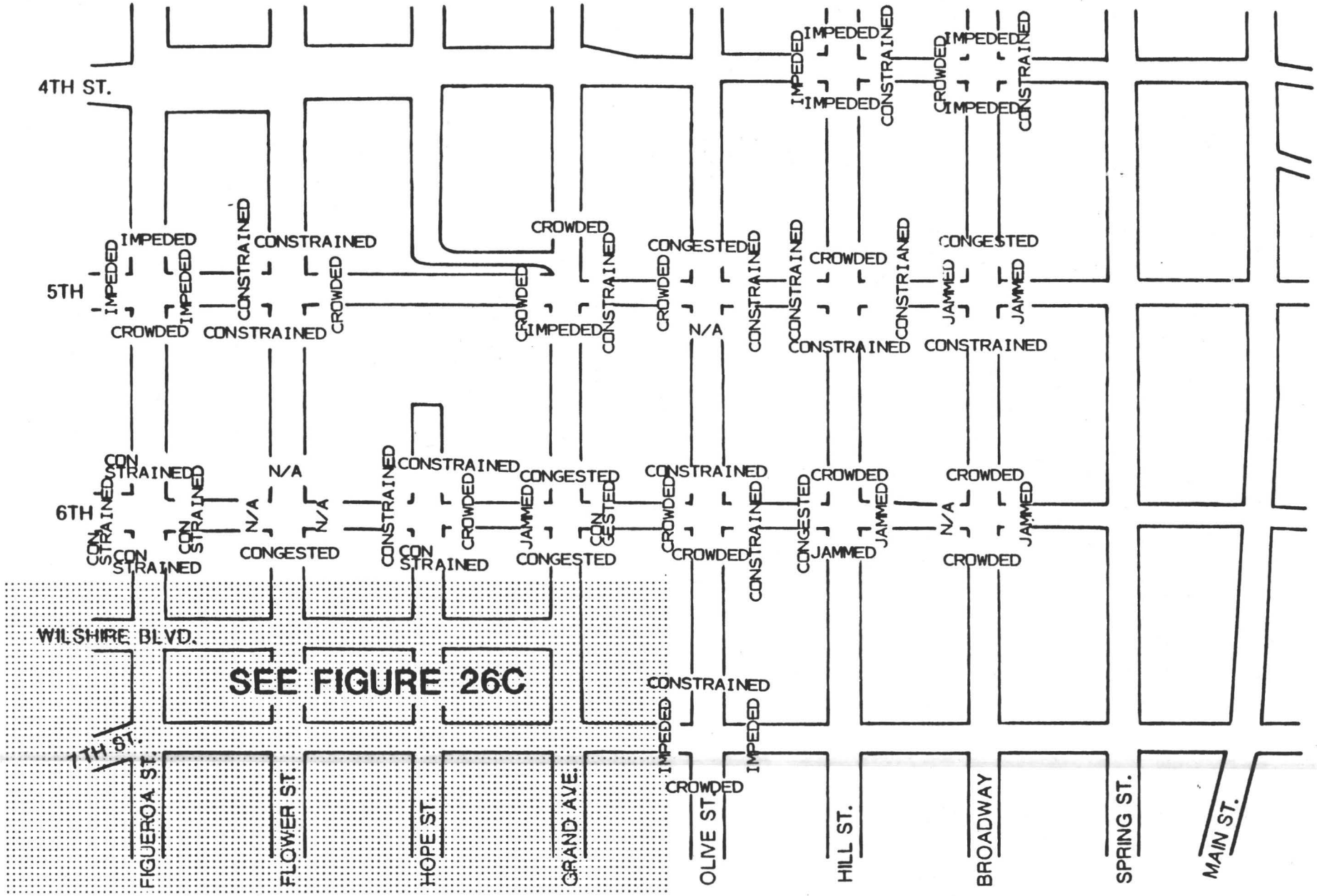
FIGURE 25D



EXISTING PLUS FUTURE PROJECTS 1985-1995
MIDDAY PEAK HOUR CROSSWALK PEDESTRIAN QUALITY OF FLOW

BARTON ASCHMAN ASSOCIATES, INC.

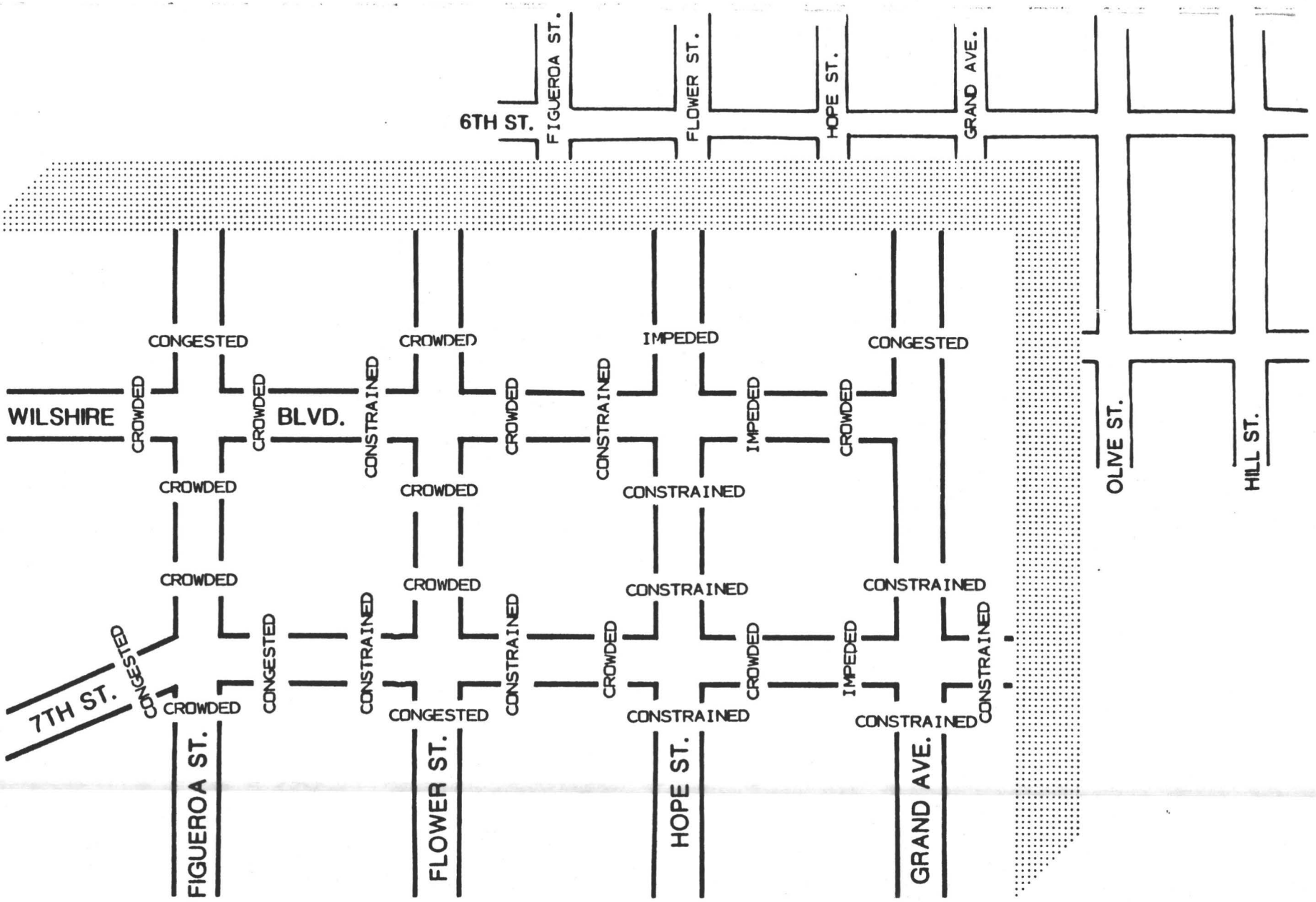
FIGURE
26A



EXISTING PLUS FUTURE PROJECTS 1985-1995
MIDDAY PEAK HOUR CROSSWALK PEDESTRIAN QUALITY OF FLOW

BARTON ASCHMAN ASSOCIATES, INC.

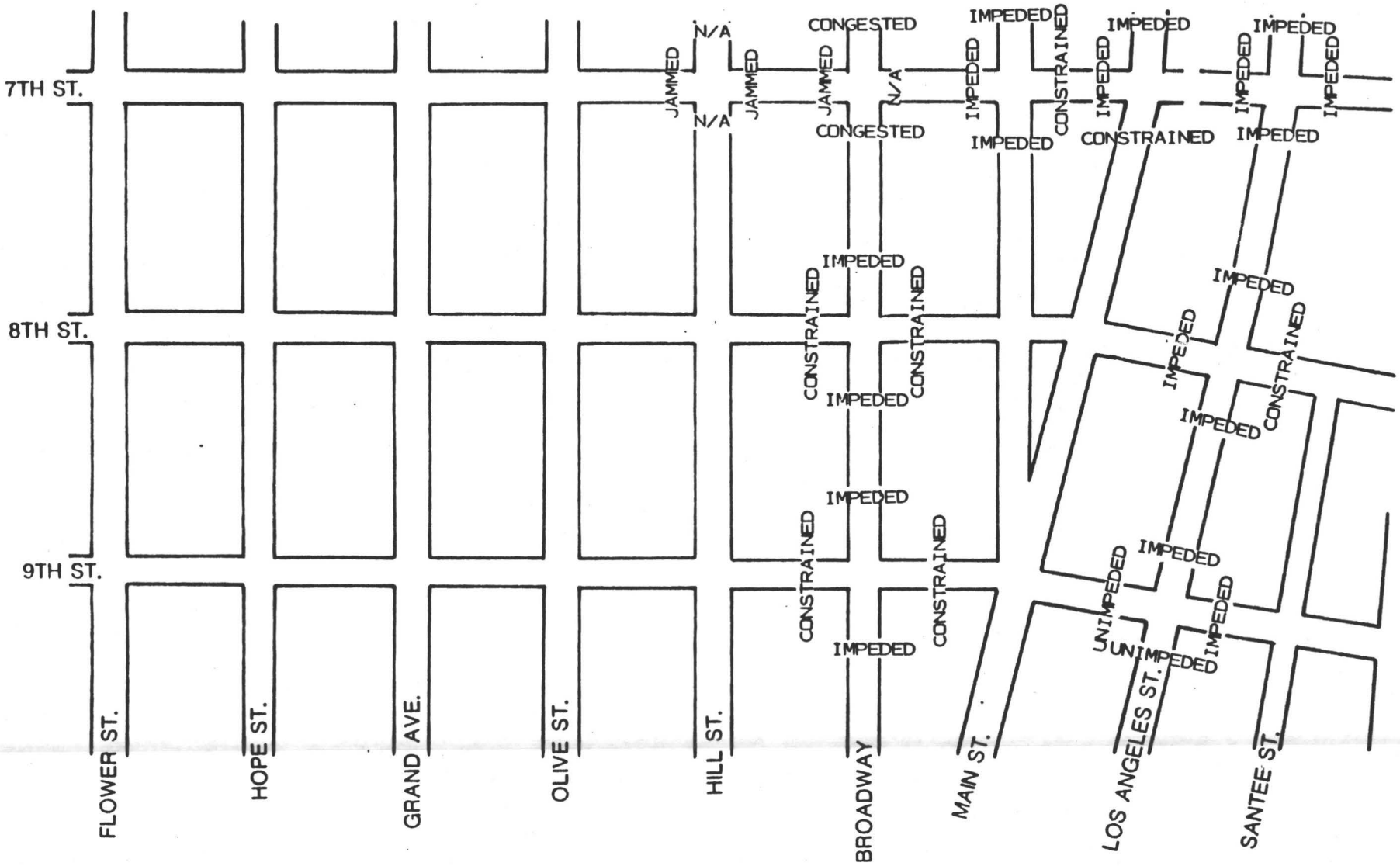
FIGURE 26B



EXISTING PLUS FUTURE PROJECTS 1985-1995
MIDDAY PEAK HOUR CROSSWALK PEDESTRIAN QUALITY OF FLOW

BARTON ASCHMAN ASSOCIATES, INC.

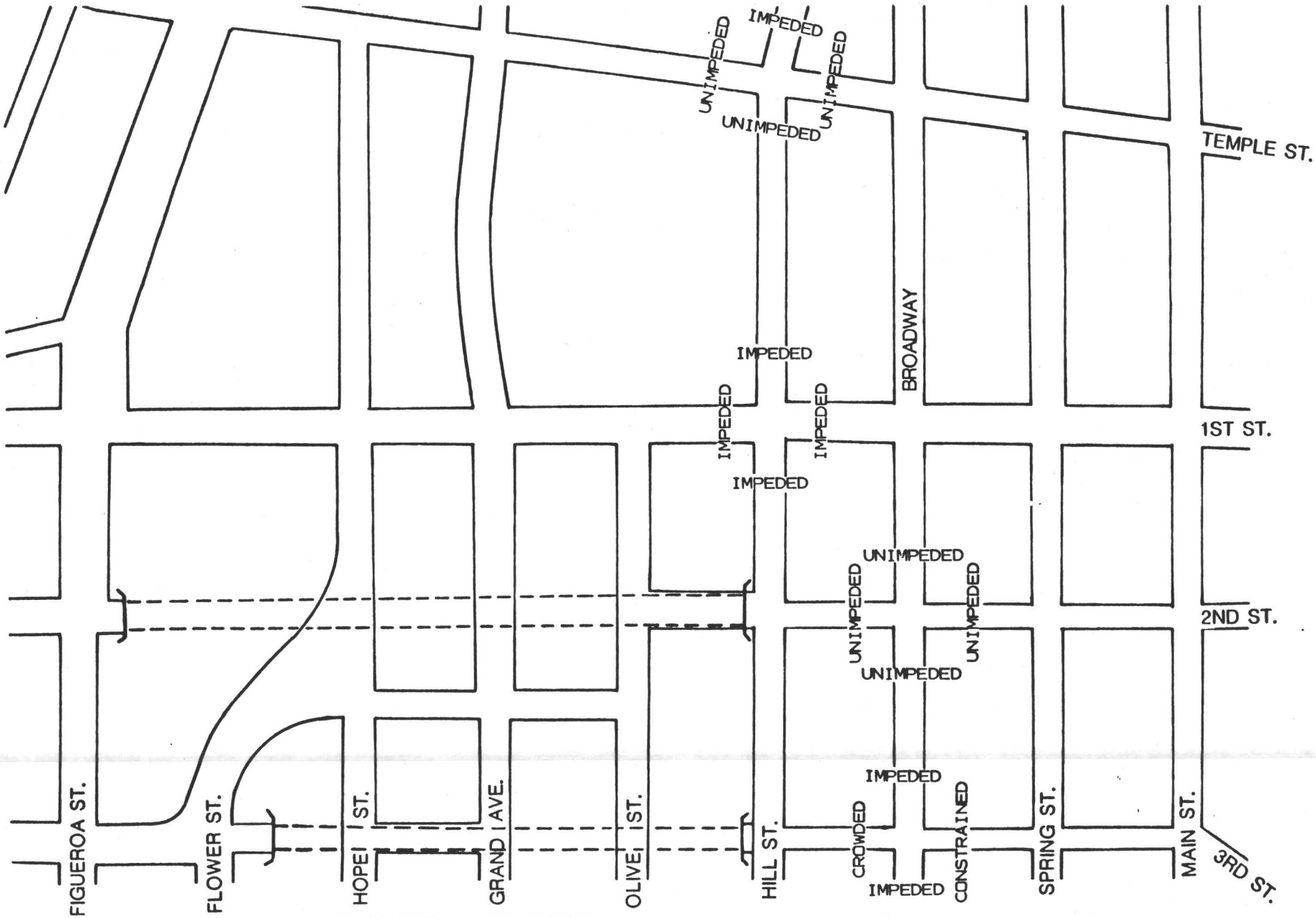
FIGURE
26C



EXISTING PLUS FUTURE PROJECTS 1985-1995
MIDDAY PEAK HOUR CROSSWALK PEDESTRIAN QUALITY OF FLOW

BARTON ASCHMAN ASSOCIATES, INC.

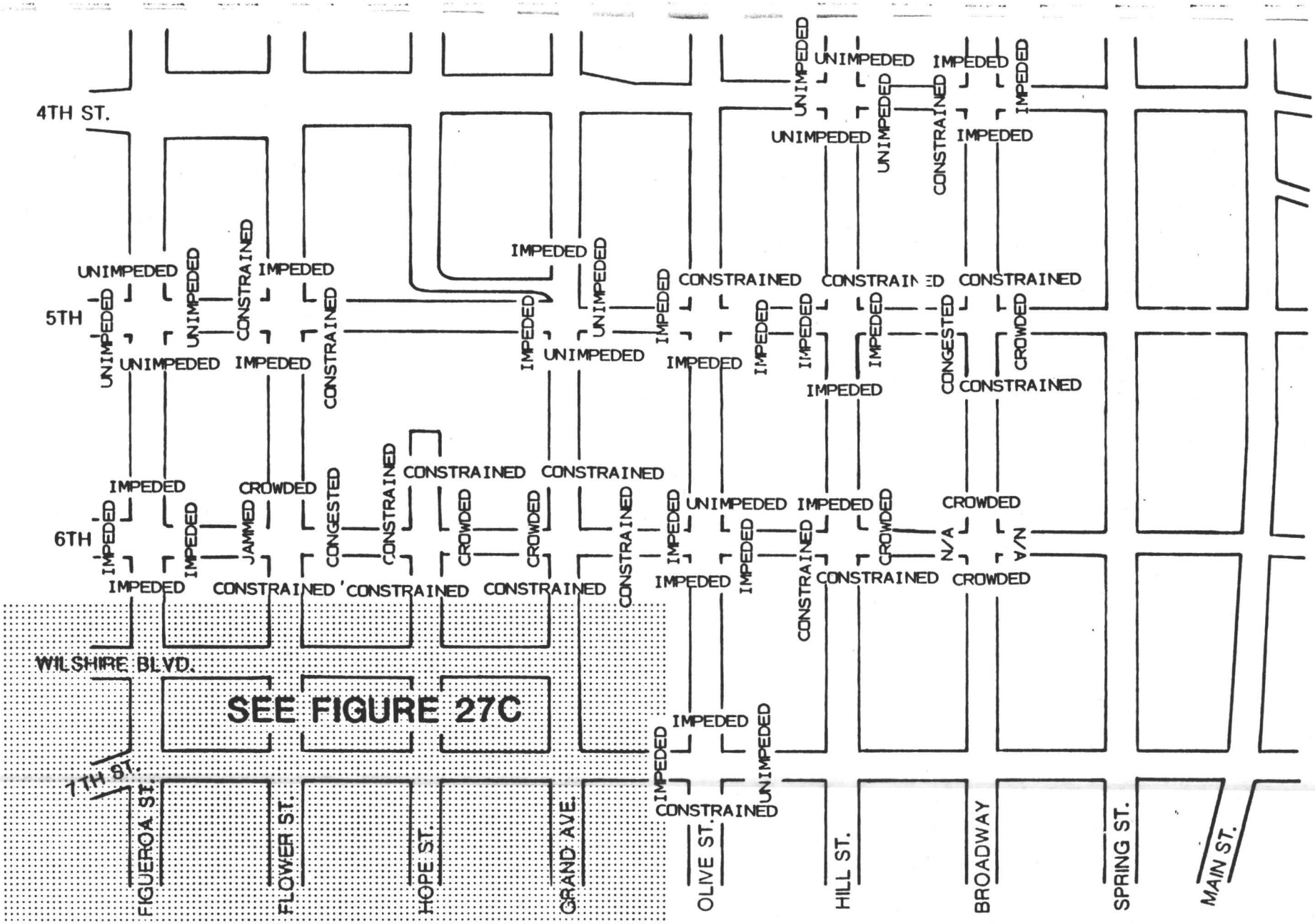
FIGURE 26D



EXISTING PLUS FUTURE PROJECTS 1985-1989
P.M. PEAK HOUR CROSSWALK PEDESTRIAN QUALITY OF FLOW

BARTON ASCHMAN ASSOCIATES, INC.

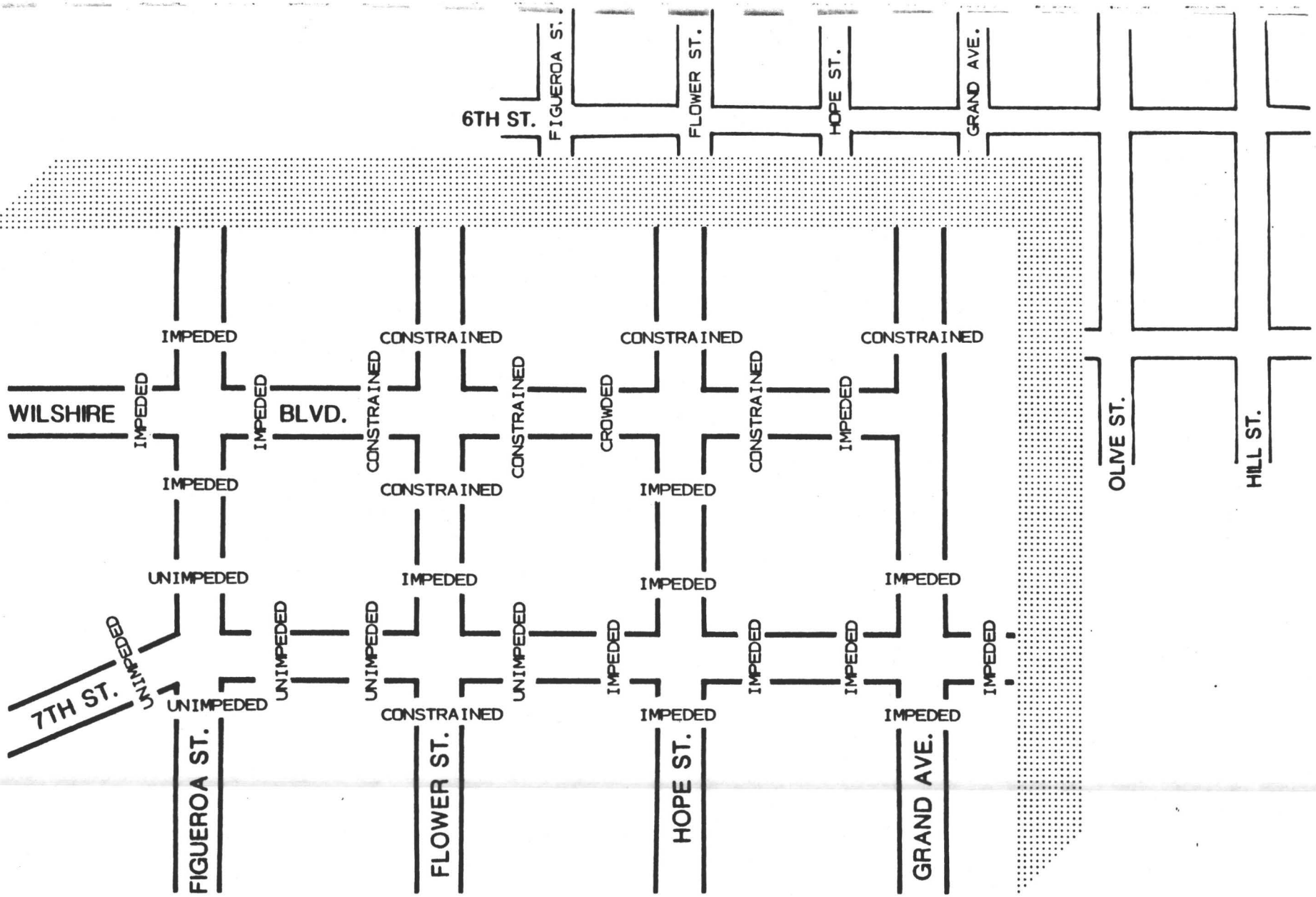
FIGURE 27A



EXISTING PLUS FUTURE PROJECTS 1985-1989
P.M. PEAK HOUR CROSSWALK PEDESTRIAN QUALITY OF FLOW

BARTON ASCHMAN ASSOCIATES INC.

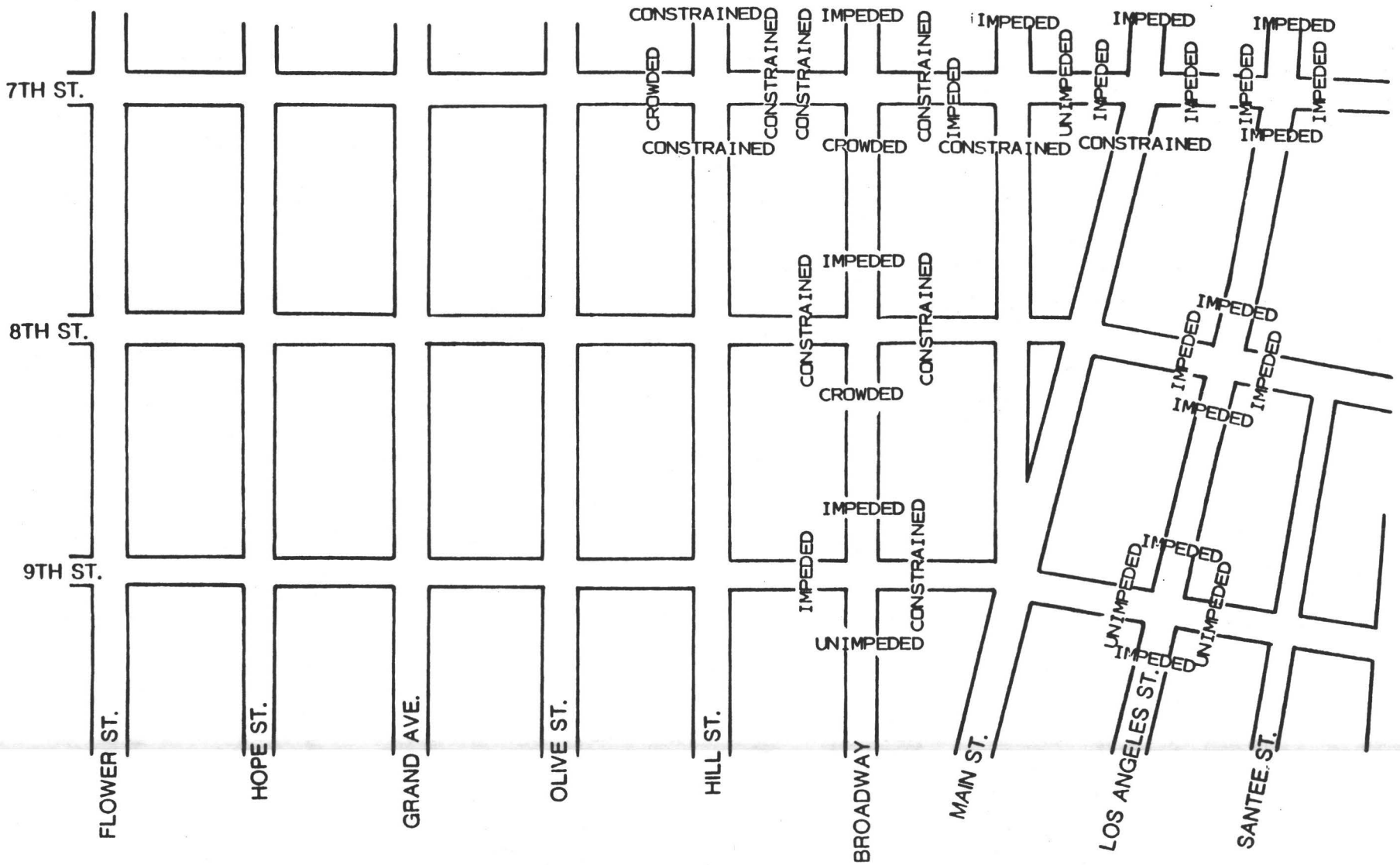
FIGURE 27B



EXISTING PLUS FUTURE PROJECTS 1985-1989
P.M. PEAK HOUR CROSSWALK PEDESTRIAN QUALITY OF FLOW

BARTON ASCHMAN ASSOCIATES, INC.

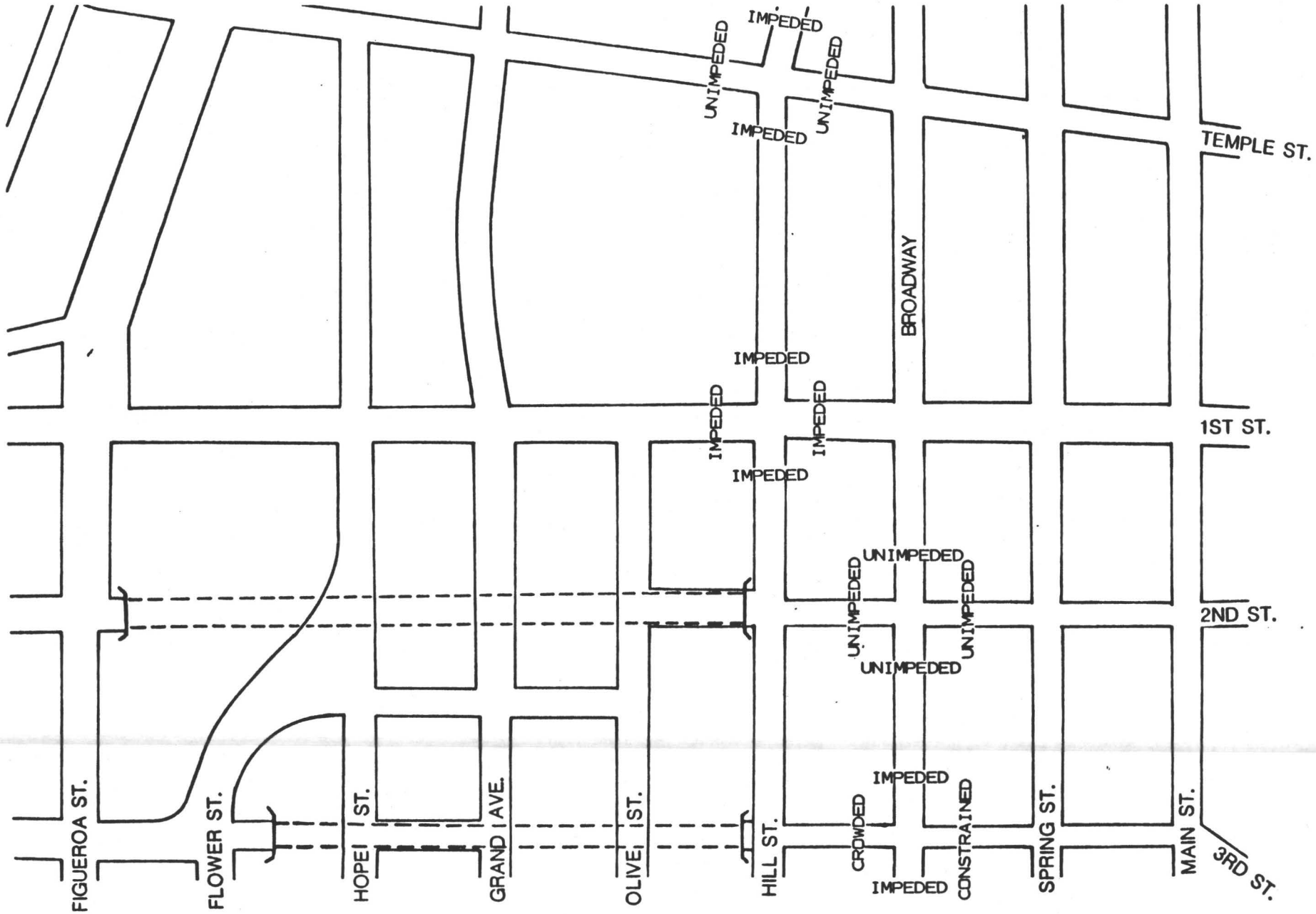
FIGURE 27C



EXISTING PLUS FUTURE PROJECTS 1985-1989
P.M. PEAK HOUR CROSSWALK PEDESTRIAN QUALITY OF FLOW

BARTON ASCHMAN ASSOCIATES, INC.

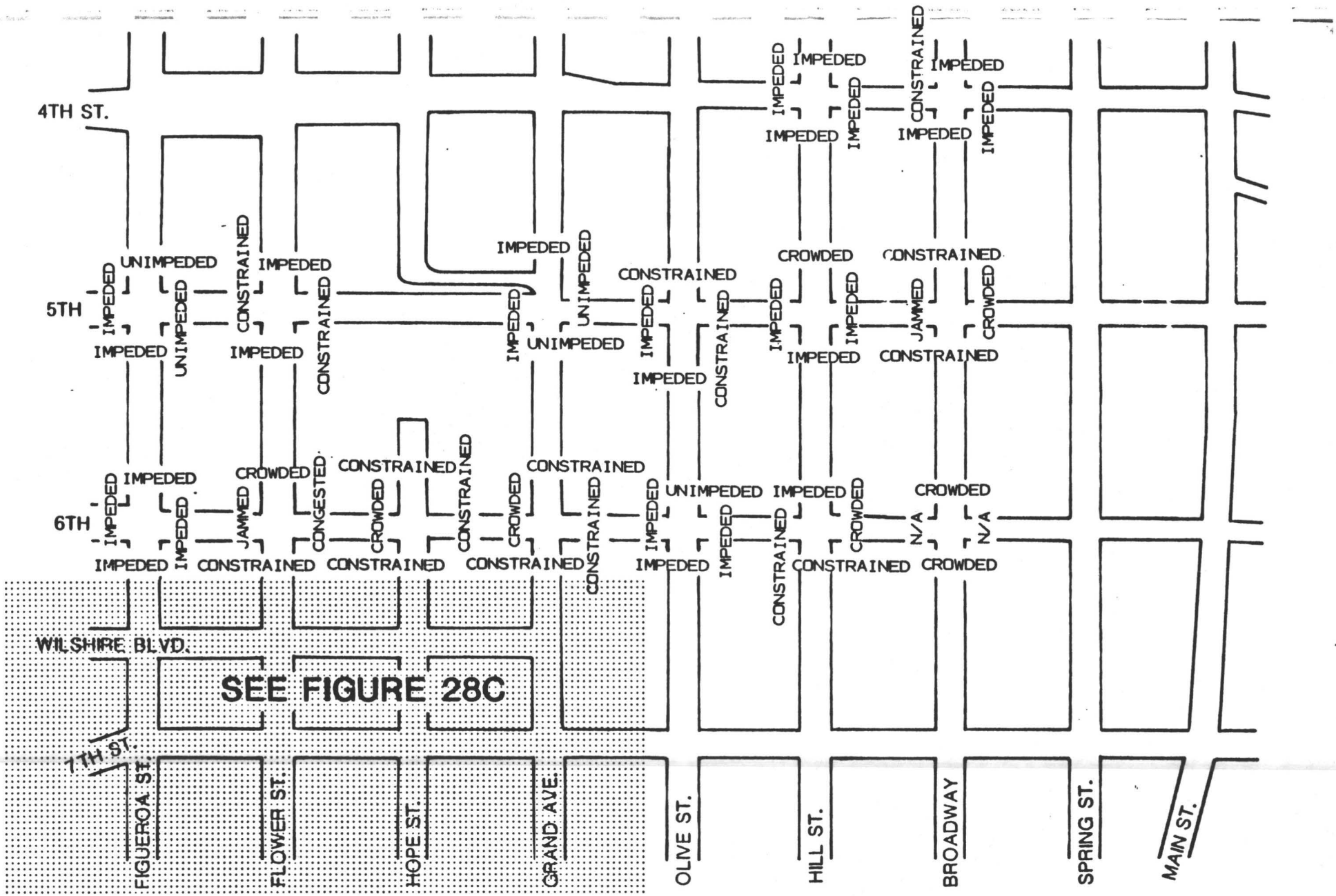
FIGURE 27D



EXISTING PLUS FUTURE PROJECTS 1985-1995
P.M. PEAK HOUR CROSSWALK PEDESTRIAN QUALITY OF FLOW

BARTON ASCHMAN ASSOCIATES, INC.

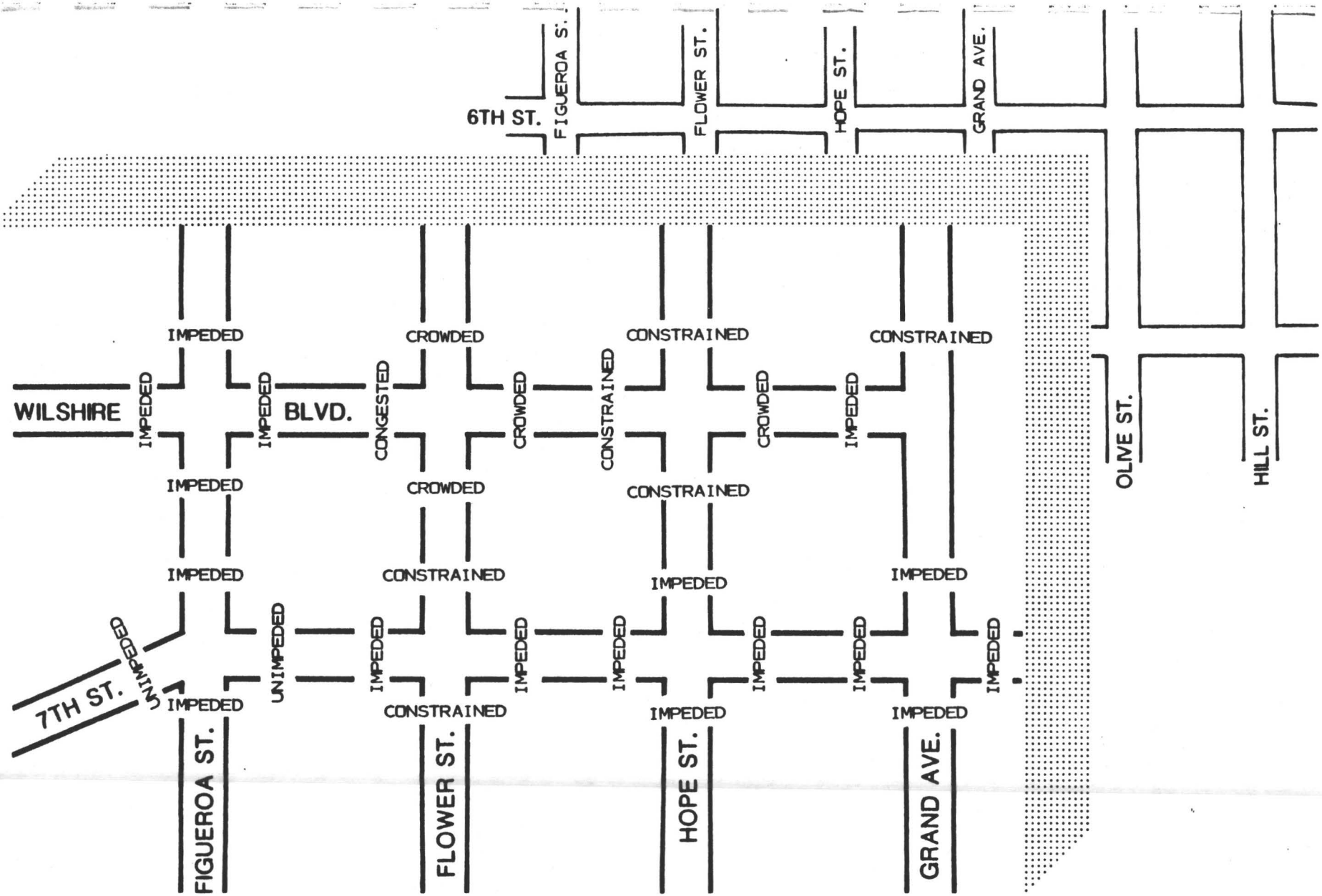
FIGURE
28A



EXISTING PLUS FUTURE PROJECTS 1985-1995
P.M. PEAK HOUR CROSSWALK PEDESTRIAN QUALITY OF FLOW

BARTON ASCHMAN ASSOCIATES, INC.

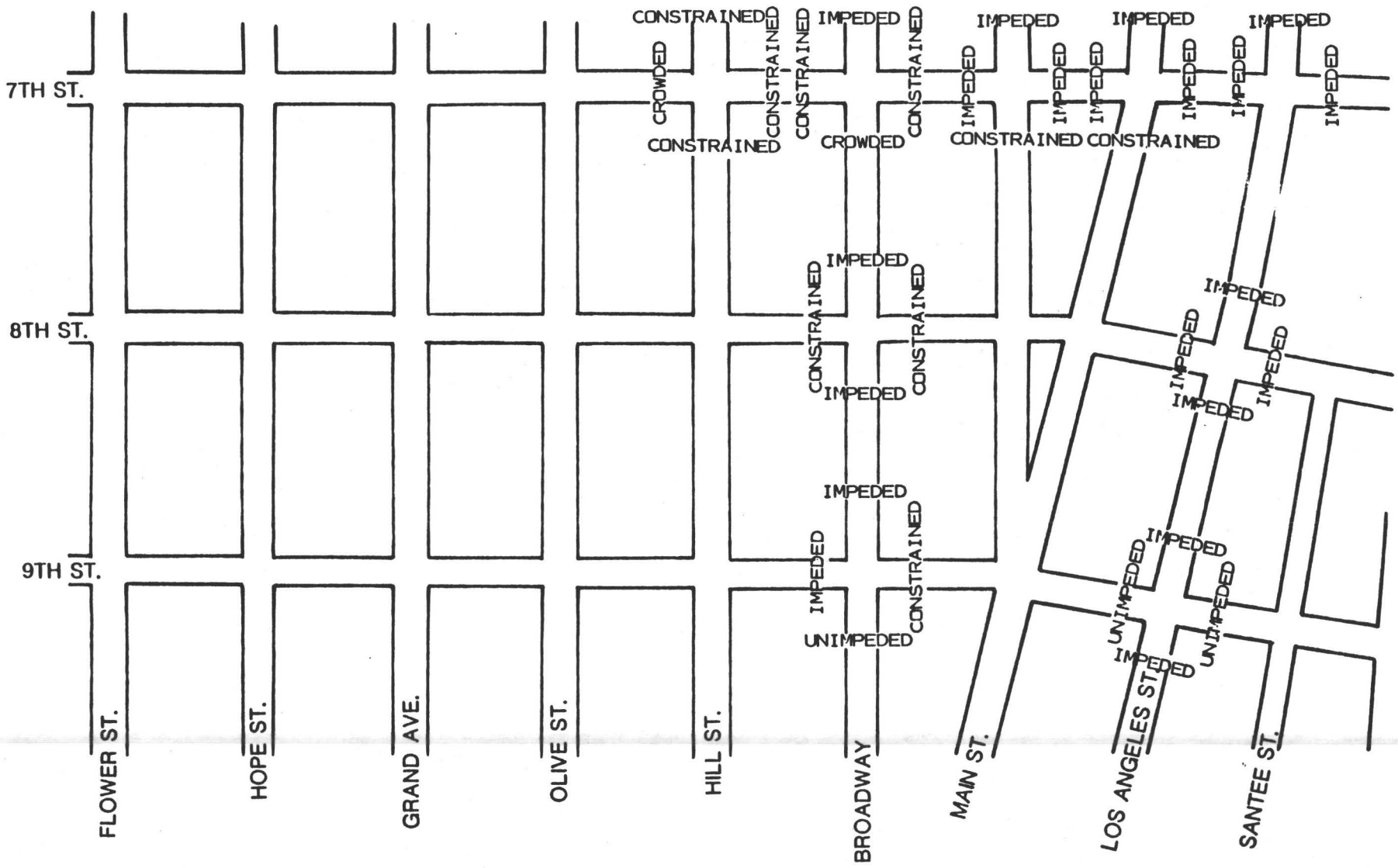
FIGURE
28B



EXISTING PLUS FUTURE PROJECTS 1985-1995
P.M. PEAK HOUR CROSSWALK PEDESTRIAN QUALITY OF FLOW

BARTON ASCHMAN ASSOCIATES, INC.

FIGURE 28C



EXISTING PLUS FUTURE PROJECTS 1985-1995
P.M. PEAK HOUR CROSSWALK PEDESTRIAN QUALITY OF FLOW

BARTON ASCHMAN ASSOCIATES, INC.

FIGURE 28D

jammed conditions. In addition, some of the crosswalks will not be able to function at all (along Sixth Street and Seventh Street).

With the addition of the 1995 future projects, the quality of flow declines at crosswalks near the Seventh Street and Hill Street station areas. In the vicinity of the Seventh Street station, quality of flow levels will range from impeded to congested. Near the Hill Street station, the quality of flow levels vary from impeded to crowded.

The quality of flow at the crosswalks declines during the evening peak hour with the addition of 1989 future projects. Along Sixth Street, quality of flow levels range from impeded to jammed. Overall, most of the crosswalks decrease to impeded-constrained conditions.

There are slight quality of flow changes associated with the addition of the 1995 future projects during the evening peak hour. The majority of crosswalks still function with impeded or constrained conditions.

Specific crosswalk locations are expected to exceed design conditions after all of the future development is completed. Those locations include:

- Broadway intersections from Third Street to Ninth Street;
- Fifth Street intersections from Figueroa to Broadway;
- Sixth Street intersections from Figueroa to Broadway;

- o Wilshire Boulevard intersections from Figueroa Street to Grand Avenue; and

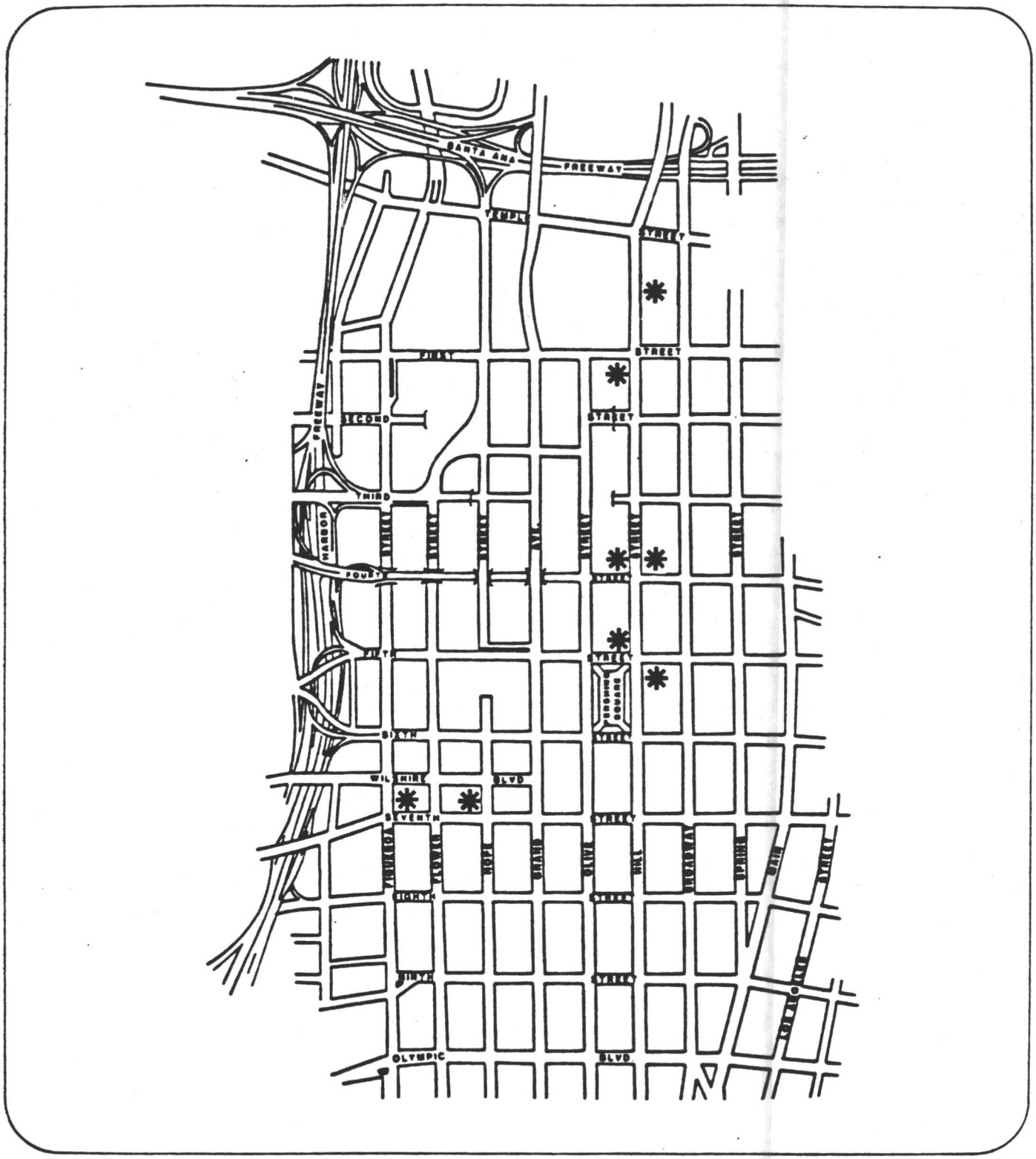
- o Seventh Street intersections from Figueroa to Broadway.

METRO RAIL EFFECT

The previous discussion has primarily related to the pedestrian trips generated by the new development forecast for downtown Los Angeles. No explicit consideration has been given to the effect that the Metro Rail system will have on pedestrian conditions. Generally, Metro Rail will not generate additional pedestrian trips. Rather, it will redistribute pedestrian trips to some extent. In particular, additional pedestrians will be concentrated in the vicinity of the Metro Rail portals. The proposed portal locations are shown on Figure 29.

It is difficult to predict the effect of these additional pedestrians with a high degree of certainty. Some of the Metro Rail-related persons are already assumed to be walking in the vicinity of the portal. For example, some might be using a bus stop or a parking facility near a proposed Metro Rail station, so that when the station opens they will travel essentially the same route. Thus, it would not be accurate to simply add Metro Rail passenger projections onto the future pedestrian projections. Doing so would result in a significant degree of double counting.

Thus, no attempt has been made to precisely quantify the effect of the Metro Rail system on downtown pedestrian conditions. Instead, the blocks surrounding the Metro Rail portals have been evaluated to establish pedestrian links that might be expected to experience a decline in quality of flow. Tables 8 and 9 contain the results of that analysis. The



✱ **PORTAL**

PROPOSED METRO RAIL PORTAL LOCATIONS

BARTON-ASCHMAN ASSOCIATES, INC.

FIGURE 29

TABLE 8

PEDESTRIAN LINKS AFFECTED BY METRO RAIL

MIDDAY PEAK HOUR

Location	Between	Quality of Flow	
		Without Metro Rail	With Metro Rail
Temple St., North Side	Olive & Hill	Unimpeded	Impeded
Temple St., South Side	Olive & Hill	Unimpeded	Impeded
Hill St., East Side	Temple & First	Unimpeded	Impeded
First St., North Side	Olive & Hill	Impeded	Constrained
First St., South Side	Olive & Hill	Impeded	Constrained
First St., North Side	Hill & Broadway	Unimpeded	Impeded
First St., South Side	Hill & Broadway	Unimpeded	Impeded
Fourth St., North Side	Hill & Broadway	Impeded	Constrained
Hill St., East Side	Fourth & Fifth	Impeded	Constrained
Fifth St., North Side	Olive & Hill	Impeded	Constrained
Fifth St., South Side	Olive & Hill	Impeded	Constrained
Fifth St., South Side	Hill & Broadway	Impeded	Constrained
Seventh St., North Side	Figueroa & Flower	Impeded	Constrained
Seventh St., North Side	Flower & Hope	Impeded	Constrained
Flower St., West Side	Seventh & Eighth	Impeded	Constrained
Hope St., West Side	Seventh & Eighth	Impeded	Constrained

TABLE 9

PEDESTRIAN LINKS AFFECTED BY METRO RAIL

PM PEAK HOUR

Location	Between	Quality of Flow	
		Without Metro Rail	With Metro Rail
Temple St., South Side	Olive & Hill	Unimpeded	Impeded
Temple St., South Side	Hill & Broadway	Unimpeded	Impeded
Hill St., West Side	Temple & First	Unimpeded	Impeded
Hill St., East Side	Temple & First	Unimpeded	Impeded
First St., North Side	Olive & Hill	Impeded	Constrained
First St., South Side	Olive & Hill	Impeded	Constrained
First St., North Side	Hill & Broadway	Unimpeded	Impeded
First St., South Side	Hill & Broadway	Unimpeded	Impeded
Hill St., East Side	First & Second	Unimpeded	Impeded
Hill St., West Side	Third & Fourth	Impeded	Constrained
Hill St., East Side	Third & Fourth	Impeded	Constrained
Fourth St., North Side	Olive & Hill	Impeded	Constrained
Fourth St., North Side	Hill & Broadway	Impeded	Constrained
Hill St., West Side	Fourth & Fifth	Unimpeded	Impeded
Hill St., East Side	Fourth & Fifth	Impeded	Constrained
Fifth St., North Side	Olive & Hill	Impeded	Constrained
Fifth St., South Side	Olive & Hill	Unimpeded	Impeded
Fifth St., South Side	Hill & Broadway	Impeded	Constrained
Seventh St., North Side	Freeway & Figueroa	Impeded	Constrained

preparation of Tables 8 and 9 was guided by the Metro Rail patronage numbers illustrated in Table 10. These numbers were obtained from the Southern California Rapid Transit District in July, 1984 and represent patronage forecasts current at that time.

As shown in Tables 8 and 9, a number of midblock areas might experience quality of flow effects as a result of Metro Rail. Generally, crosswalks near the portals will experience relatively small effects.

TABLE 10

METRO RAIL PATRONAGE FORECAST

PEDESTRIAN TRIPS ONLY

	AM Peak Hour		Midday Period		PM Peak Hour	
Station	Arrivals	Departures	Arrivals	Departures	Arrivals	Departures
Civic Center	223	2,478	4,146	3,679	2,079	465
Fifth/Hill	594	3,972	9,101	8,283	3,603	1,120
Seventh/Flower	261	1,857	2,989	2,662	1,543	403

Source: Southern California Rapid Transit District, July 20, 1984.

5.

RECOMMENDATIONS FOR IMPROVING THE PEDESTRIAN ENVIRONMENT

This chapter describes recommendations for maintaining and improving the quality of pedestrian circulation in downtown Los Angeles. The recommendations are presented in several categories, including:

- Sidewalk Widenings;
- Effective Width Improvements;
- Traffic Signal Improvements;
- Vehicular Traffic Control;
- Metro Rail Portal Locations; and
- Minimum Sidewalk Standards.

SIDEWALK WIDENINGS

One method of increasing the capacity of existing sidewalks and thus improving the pedestrian quality of flow is to widen existing sidewalks. In most cases, sidewalk widenings are very difficult to attain since they require either the acquisition of existing developed, privately-owned property or the reduction of roadway space. However, redevelopment projects proposed at several study area locations provide the opportunity for widening sidewalks through selected building setbacks. Among the most important of these locations is the east side of Hill Street south of Fifth Street, where sidewalk widths are currently narrow and pedestrian activity is high. It is recommended that building setbacks on this site be lined up with those of the Jewelry Mart building to the south, in order to provide a continuous pedestrian path as well as a sheltered area in which pedestrians may wait for buses operating on Hill Street. Sidewalks on Hill and First Streets fronting the Metro Rail portal proposed for the southwest quadrant of the intersection of those two streets should be at least 20 feet wide in order to accommodate pedestrian traffic as well as pedestrians waiting for buses. Shelter for persons waiting for buses should be incorporated into building plans, as bus activity in all the study areas will continue to be heavy before and after the implementation of Metro Rail.

In some locations, it may be possible to obtain sidewalk widenings through the narrowing of study area roadways. An evaluation of the potential for this type of widening would need to examine projected vehicular volumes as well as projected pedestrian volumes. Candidate locations for this type of evaluation include Hill Street in the Civic Center area, where roadway widths are greater than on other portions of Hill Street, and on Fourth Street west of Hill Street, where sidewalks are narrow, projected pedestrian volumes are high, and vehicular activity appears to be low.

EFFECTIVE WIDTH IMPROVEMENTS

The City of Los Angeles currently does a very good job of maximizing the effective width of downtown sidewalks by placing all fire hydrants, light poles, sign posts, trash receptacles and mail boxes close to the curb and in line with one another, thus minimizing their impact on the effective width of the sidewalk. This practice should be continued, and sidewalks should be monitored to prevent any losses in existing effective widths due to new street furniture.

The placement of additional newsracks, bus shelters and sign posts should be carefully monitored in the study areas, particularly near crosswalks serving Metro Rail stations. No street furniture should be permitted on curbs between the crosswalk lines or in front of bus stops. All street furniture should be restricted from pedestrian "reservoir" areas. Bus shelters should be integrated into the sides of buildings in order to place them out of the flow of pedestrian traffic. Roofs extending from existing buildings over the sidewalk would provide shelter from rain and sun without impacting pedestrian traffic. If additional newsracks are desired by publishers, they should be placed in double or triple decked racks or manned news stands which sell a variety of publications from one booth. Future guide signs designed to direct pedestrians or drivers to Metro Rail stations should be mounted to existing poles or to poles that do not interfere with pedestrian circulation.

Appendix D illustrates the effective width requirements for satisfactory pedestrian flow under a variety of conditions.

TRAFFIC SIGNAL IMPROVEMENTS

Pedestrian crosswalk volumes should be considered along with vehicular volumes in distributing the proportion of green time afforded to intersecting streets. In order to reduce congestion within the reservoir areas of downtown intersections, it is recommended that traffic signal cycle lengths be reduced from 70 to 60 seconds during the noontime peak in pedestrian travel. At the midblock crosswalk on Hill Street between First and Temple Streets in front of the proposed Court of Flags subway portal, consideration should be given to a regular red phase rather than the existing button-activated flashing red indication. Existing conflicts between this crosswalk and traffic emerging from the parking lot driveway just southeast of it also need to be resolved. Finally, consideration should be given to longer WALK indications prior to the flashing DON'T WALK indication during the green phase of many signals.

VEHICULAR TRAFFIC CONTROL

Turning vehicles and vehicles emerging from driveways can present safety problems as well as delays and annoyances to pedestrians. Right and left turns across heavily used crosswalks should be discouraged, and development plans should be reviewed with this thought in mind. Similarly, driveways and other curb cuts should be discouraged across all study area sidewalks. Goods deliveries should be planned to be made on the sides of the buildings least utilized by pedestrians, or from alleyways.

METRO RAIL PORTAL LOCATIONS

While preliminary subway portal locations have already been established, some flexibility does remain in the placement of additional portals. The

additional portal considered at the southwest quadrant of the intersection of Fifth and Hill Streets (within Pershing Square) was not found to significantly improve pedestrian levels of service there. However, the additional portal at the southwest corner of Figueroa and Seventh Streets would greatly decrease crosswalk congestion in that area. Finally, it is recommended that shelter over subway portal escalators and stairs be provided in order to prevent wetness on rainy days and to minimize pedestrian conflicts caused by umbrella usage.

MINIMUM SIDEWALK STANDARDS

In order to ensure adequate pedestrian circulation on all downtown streets, it is recommended that a set of minimum standards for sidewalk widths, crosswalk widths and reservoir areas be established. Each of these standards is discussed below.

Minimum Sidewalk Width Standards

It is recommended that a minimum desirable sidewalk standard of 12 feet be established for the downtown area. Based on an average loss of approximately 3 feet of effective sidewalk width on the curb side of Los Angeles sidewalks due to street furniture, and a "shy distance" of 1.5 feet on the property line side of the sidewalk, this standard would provide a minimum of 7.5 feet of effective sidewalk space. This width would be sufficient to accommodate the occasional surges in pedestrian traffic which occur from time to time in uncongested pedestrian areas due to traffic signals, elevators, and slow moving pedestrians.

Minimum Crosswalk Width Standards

The existing 20 foot crosswalk widths on downtown streets appear to be sufficient to meet projected 1995 demands throughout the study area. It is recommended that these widths be retained and adopted as a standard for all downtown streets.

Minimum Reservoir Area Standards

In order to prevent congestion within reservoir areas, it is recommended that the length of curb radii be minimized, thus expanding the space available to pedestrians in these areas. It is desirable that curb radii be no longer than sidewalk widths, and that corners of downtown buildings be designed to maximize ground level sidewalk space for pedestrians.

APPENDIX A

EXISTING OVERALL SIDEWALK WIDTHS

EXISTING OVERALL SIDEWALK WIDTHS-- DOWNTOWN LOS ANGELES

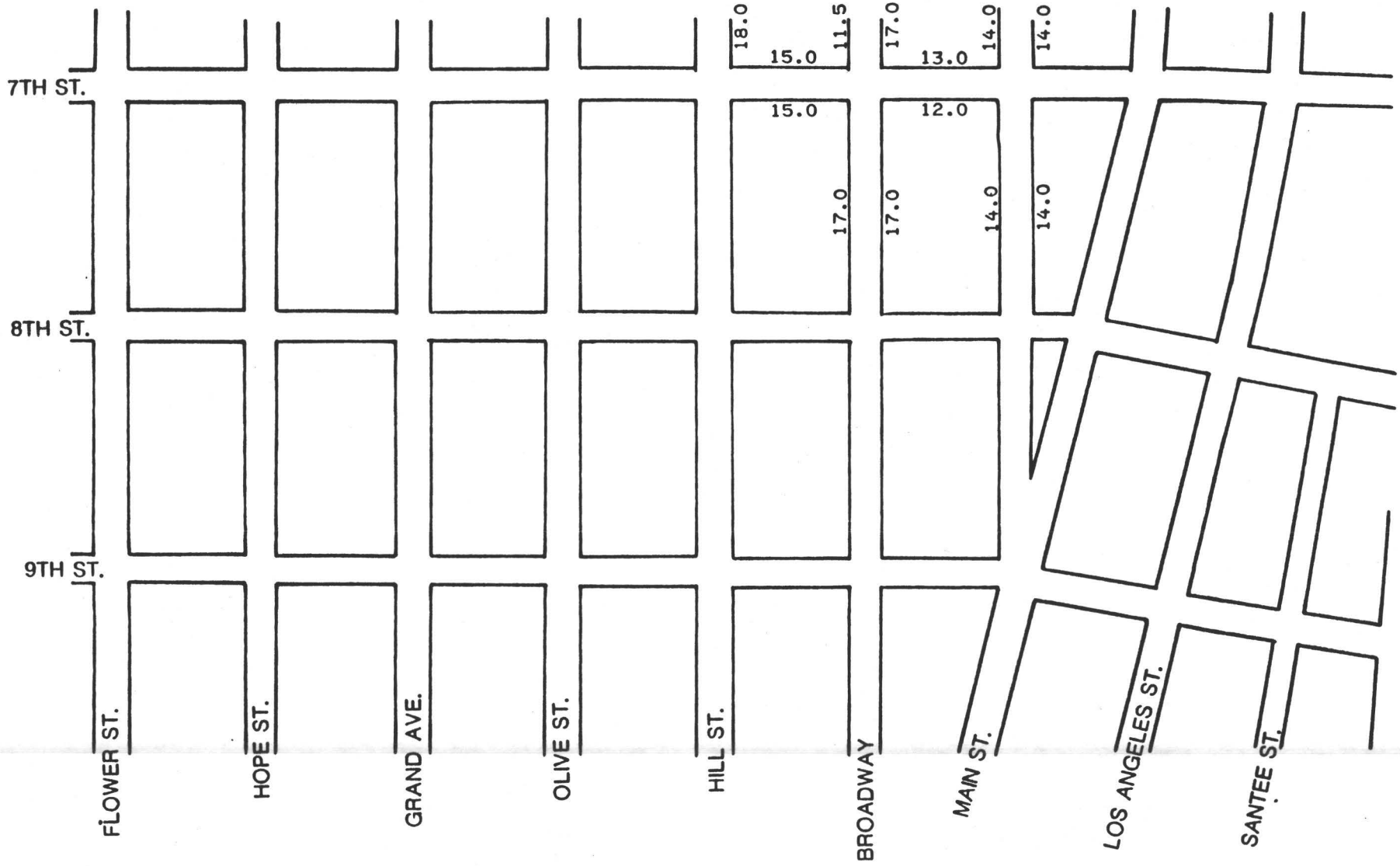
BARTON ASCHMAN ASSOCIATES, INC.

FIGURE A-1

EXISTING OVERALL SIDEWALK WIDTHS — DOWNTOWN LOS ANGELES

BARTON ASCHMAN ASSOCIATES, INC.

FIGURE A-2



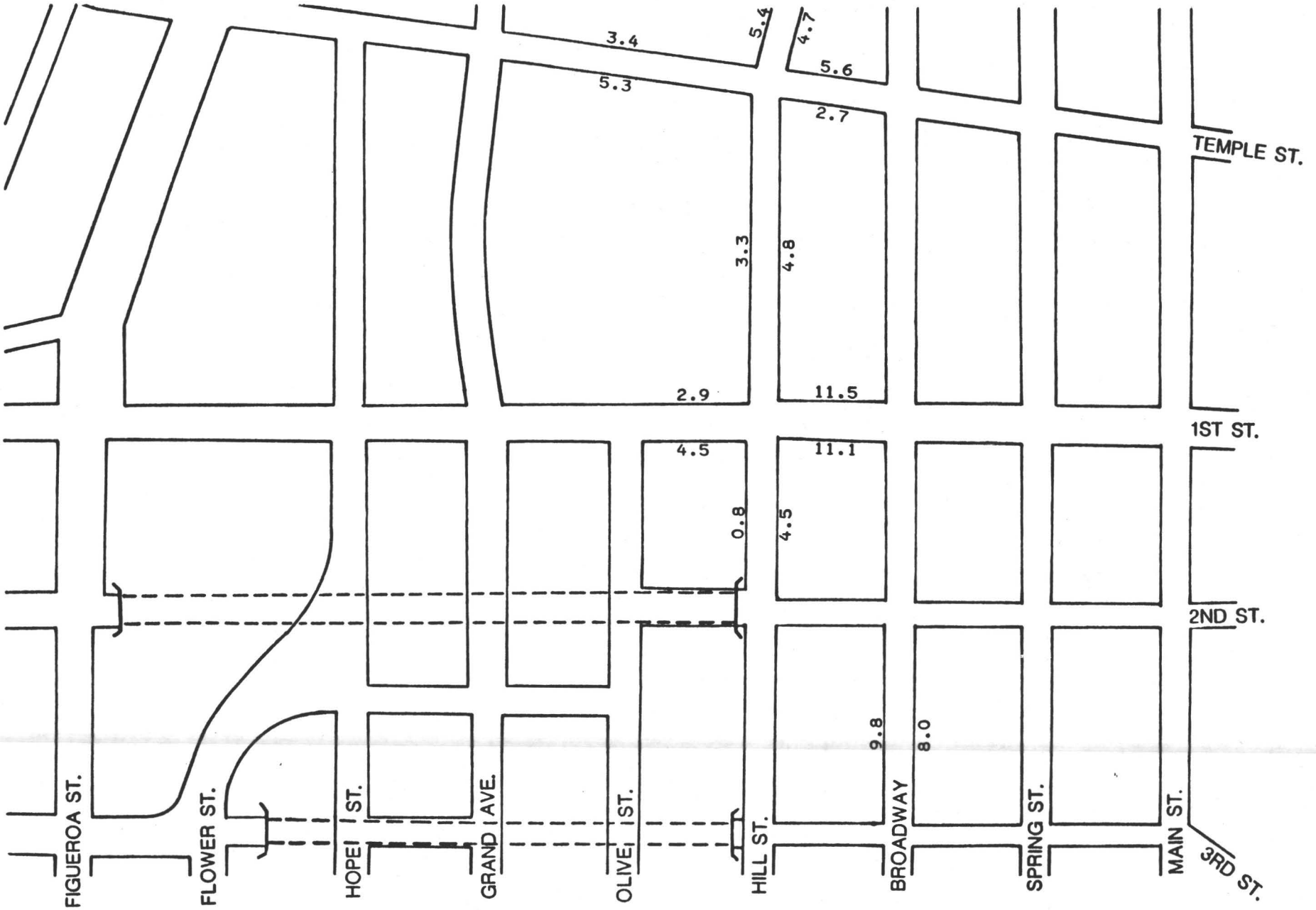
EXISTING OVERALL SIDEWALK WIDTHS — DOWNTOWN LOS ANGELES

BARTON ASCHMAN ASSOCIATES, INC.

FIGURE A-3

APPENDIX B

EXISTING EFFECTIVE SIDEWALK WIDTHS



EFFECTIVE SIDEWALK WIDTHS–DOWNTOWN LOS ANGELES

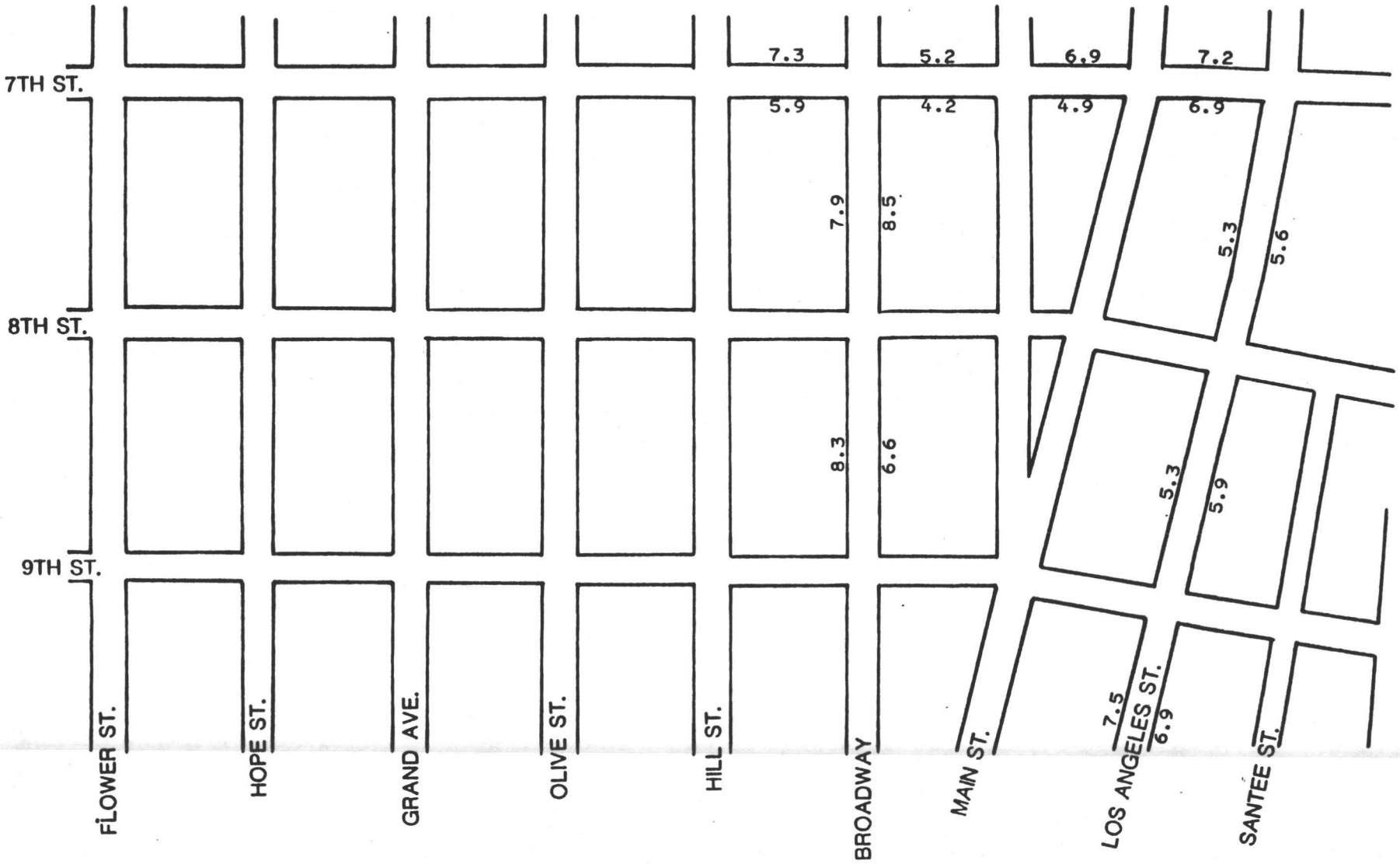
BARTON ASCHMAN ASSOCIATES, INC.

FIGURE B-1

EFFECTIVE SIDEWALK WIDTHS–DOWNTOWN LOS ANGELES

BARTON ASCHMAN ASSOCIATES, INC.

FIGURE B–2



EFFECTIVE SIDEWALK WIDTHS–DOWNTOWN LOS ANGELES

BARTON ASCHMAN ASSOCIATES, INC.

FIGURE B-3

APPENDIX C

PEDESTRIAN SURVEY

DOWNTOWN LOS ANGELES

CBD PEDESTRIAN ACTIVITY

SURVEY ANALYSIS

Source: Pedestrian Studies of Metro Rail Station Areas

Wilbur Smith and Associates

September, 1984

DOWNTOWN LOS ANGELES
CBD PEDESTRIAN ACTIVITY
SURVEY ANALYSIS

SUMMARY OF SURVEY LOCATIONS

1. LOCATION: Civic Center Station Area Located on Hill Street between First and Temple Streets

   DATE OF SURVEY: June 5, 1984

   DAY OF THE WEEK: Tuesday

   NUMBER OF SURVEYS: 67

2. LOCATION: Hill Street Station Area located on Hill Street between Fourth and Fifth Streets

   DATE OF SURVEY: June 6, 1984

   DAY OF THE WEEK: Wednesday

   NUMBER OF SURVEYS: 39

3. LOCATION: Seventh Street Station Area located on Seventh Street between Figueroa and Grand Streets

   DATE OF SURVEY: June 8, 1984

   DAY OF THE WEEK: Friday

   NUMBER OF SURVEYS: 186

4. LOCATION: Hill Street and Seventh Street Station Locations

   DATE OF SURVEY: June 9, 1984

   DAY OF THE WEEK: Saturday

   NUMBER OF SURVEYS: 28

DOWNTOWN LOS ANGELES
CBD PEDESTRIAN ACTIVITY
SURVEY ANALYSIS

SUMMARY OF SURVEY RESPONSES

1. MODE OF TRANSPORTATION

	Civic Center Station Area Weekday Survey		Hill Street Station Area Weekday Survey		Seventh Street Station Area Weekday Survey		Hill & Seventh Street Station Areas Saturday Survey	
	Number	Percent	Number	Percent	Number	Percent	Number	Percent
Auto Driver	38	57	12	31	70	38	10	38
Auto Passenger	6	9	1	3	10	5	1	4
Bus	20	30	23	60	89	48	14	54
Vanpool	2	3	0	0	3	2	0	0
Walk	0	0	1	3	13	7	1	4
Bicycle	0	0	0	0	0	0	0	0
Motorcycle	1	1	0	0	0	0	0	0
Live in Downtown Area	0	1	1	3	0	0	0	0
Total Responses	67	100	38	100	185	100	26	100

DOWNTOWN LOS ANGELES
CBD PEDESTRIAN ACTIVITY
SURVEY ANALYSIS

SUMMARY OF SURVEY RESPONSES

2. TRIP PURPOSE TO TRAVEL DOWNTOWN

	Civic Center Station Area Weekday Survey		Hill Street Station Area Weekday Survey		Seventh Street Station Area Weekday Survey		Hill & Seventh Street Station Areas Saturday Survey	
	Number	Percent	Number	Percent	Number	Percent	Number	Percent
Downtown Employment	46	70	20	54	103	56	4	15
Shopping	0	0	5	14	34	18	17	65
Business Meeting	1	2	1	2	6	3	1	4
Personal Business	18	27	8	22	28	15	2	8
School	1	1	0	0	7	4	0	0
Bus Transfer	0	0	3	8	0	0	0	0
Sightsee	0	0	0	0	2	1	1	4
Eat	0	0	0	0	2	1	1	4
Library	0	0	0	0	1	1	0	0
Preach	0	0	0	0	1	1	0	0
Total	66	100	37	100	184	100	26	100

DOWNTOWN LOS ANGELES
CBD PEDESTRIAN ACTIVITY
SURVEY ANALYSIS

SUMMARY OF SURVEY RESPONSES

5. MAIN PURPOSE OF WALKING TRIP

	Civic Center Station Area Weekday Survey		Hill Street Station Area Weekday Survey		Seventh Street Station Area Weekday Survey		Hill & Seventh Street Station Areas Saturday Survey	
	Number	Percent	Number	Percent	Number	Percent	Number	Percent
To/From Work	29	44	13	35	44	25	3	12
To/From Shopping	0	0	7	19	35	20	17	65
To/From Eating	2	3	3	8	29	17	1	4
Business	9	14	2	6	15	9	0	0
Personal Business (Errand)	19	29	9	24	37	22	2	8
Recreation	4	6	3	8	10	6	3	11
Church	1	1	0	0	0	0	0	0
Bus Stop	2	3	0	0	0	0	0	0
School	0	0	0	0	2	1	0	0
Total	66	100	37	100	172	100	26	100

DOWNTOWN LOS ANGELES
CBD PEDESTRIAN ACTIVITY
SURVEY ANALYSIS

SUMMARY OF SURVEY RESPONSES

6. REASON THIS STREET CHOSEN TO WALK ALONG

	Civic Center Station Area Weekday Survey		Hill Street Station Area Weekday Survey		Seventh Street Station Area Weekday Survey		Hill & Seventh Street Station Areas Saturday Survey	
	Number	Percent	Number	Percent	Number	Percent	Number	Percent
Shortest	51	82	34	92	128	78	15	54
Least Crowded	2	3	2	5	1	1	2	7
Most Interesting	4	6	1	3	8	5	2	7
Most Familiar	1	2	0	0	3	2	1	4
Most Attractive	1	2	0	0	4	2	0	0
Safest	1	2	0	0	8	5	0	0
Assigned Route	1	2	0	0	0	0	0	0
Bus Stop on Route	1	2	0	0	6	4	8	29
Shopping	0	0	0	0	1	1	0	0
Most Crowded	0	0	0	0	1	1	0	0
Girl Watching	0	0	0	0	2	1	0	0
Lost	0	0	0	0	1	1	0	0
Shade	0	0	0	0	1	1	0	0
Total	62	100	37	100	164	100	28	100

DOWNTOWN LOS ANGELES
CBD PEDESTRIAN ACTIVITY
SURVEY ANALYSIS

SUMMARY OF SURVEY RESPONSES

7. WHAT PEDESTRIANS FOUND PLEASANT ABOUT WALKING TRIP

	Civic Center Station Area Weekday Survey		Hill Street Station Area Weekday Survey		Seventh Street Station Area Weekday Survey		Hill & Seventh Street Station Areas Saturday Survey	
	Number	Percent	Number	Percent	Number	Percent	Number	Percent
Weather	2	3	1	3	67	36	10	36
Fresh Air	1	1	2	5	20	11	1	4
Landscaping	9	13	1	3	19	10	2	7
Uncrowded	2	3	1	3	5	3	0	0
Place to Sit	1	1	0	0	0	0	0	0
Appearance	6	9	1	3	10	5	2	7
Sidewalk Activity	4	6	1	3	26	14	4	14
Shop Windows	2	3	4	10	22	12	5	18
Quiet	1	1	0	0	2	1	0	0
Nothing	21	31	18	46	10	5	1	4
People	1	1	2	5	0	0	0	0
Girl Watch	2	3	1	3	4	2	0	0
Boy Watch	0	0	0	0	1	1	0	0
Diversity	7	10	0	0	0	0	1	4
Low Traffic	0	0	0	0	1	1	0	0
Everything	2	3	0	0	2	2	0	0
Hate It	2	3	0	0	0	0	0	0
Convenient	2	3	0	0	0	0	0	0
Lights	1	1	0	0	0	0	0	0
Buildings	0	0	2	5	0	0	0	0
Safety	0	0	0	0	6	3	0	0

DOWNTOWN LOS ANGELES
CBD PEDESTRIAN ACTIVITY
SURVEY ANALYSIS

SUMMARY OF SURVEY RESPONSES

8. WHAT PEDESTRIANS FOUND UNPLEASANT ABOUT WALKING TRIP

	Civic Center Station Area Weekday Survey		Hill Street Station Area Weekday Survey		Seventh Street Station Area Weekday Survey		Hill & Seventh Street Station Areas Saturday Survey	
	Number	Percent	Number	Percent	Number	Percent	Number	Percent
Weather	4	6	2	5	9	5	0	0
Too Crowded	16	24	11	28	35	19	8	29
Delays at Intersections	3	4	2	5	11	6	0	0
Sidewalks too Narrow	3	4	2	5	17	9	0	0
Traffic	25	37	6	15	37	20	3	11
Dirty (Bad Appearance)	11	16	16	41	49	26	6	21
Air Pollution, Exhaust	19	28	10	26	24	13	1	4
Easy to Get Lost, Confusing	4	6	1	3	3	2	1	4
Smells	5	7	4	10	19	10	1	4
Noise	9	13	3	8	27	15	1	4
No Place to Sit	3	4	2	5	6	3	2	7
Unsafe from Crime	7	10	5	13	19	10	0	0
No Shops or Stores	2	3	3	8	1	1	0	0
Too Many Obstacles	3	4	1	3	2	1	0	0
Uninteresting	2	3	1	3	1	1	0	0
Bums	12	18	11	28	19	10	2	7
Buses	3	4	0	0	0	0	0	0
Nothing	3	4	2	5	17	9	2	7
Ugly Buildings	1	1	0	0	0	0	0	0
Construction	0	0	0	0	9	5	0	0
Everything	0	0	1	3	0	0	0	0
Convenient	0	0	1	3	0	0	0	0
Birds	0	0	1	3	0	0	0	0
Hard Pavement	0	0	0	0	1	1	0	0

A P P E N D I X D

NEEDED EFFECTIVE SIDEWALK WIDTHS

EFFECTIVE WIDTH NEEDED -- EXISTING CONDITIONS/MIDDAY PEAK HOUR

BARTON ASCHMAN ASSOCIATES, INC.

FIGURE D-1

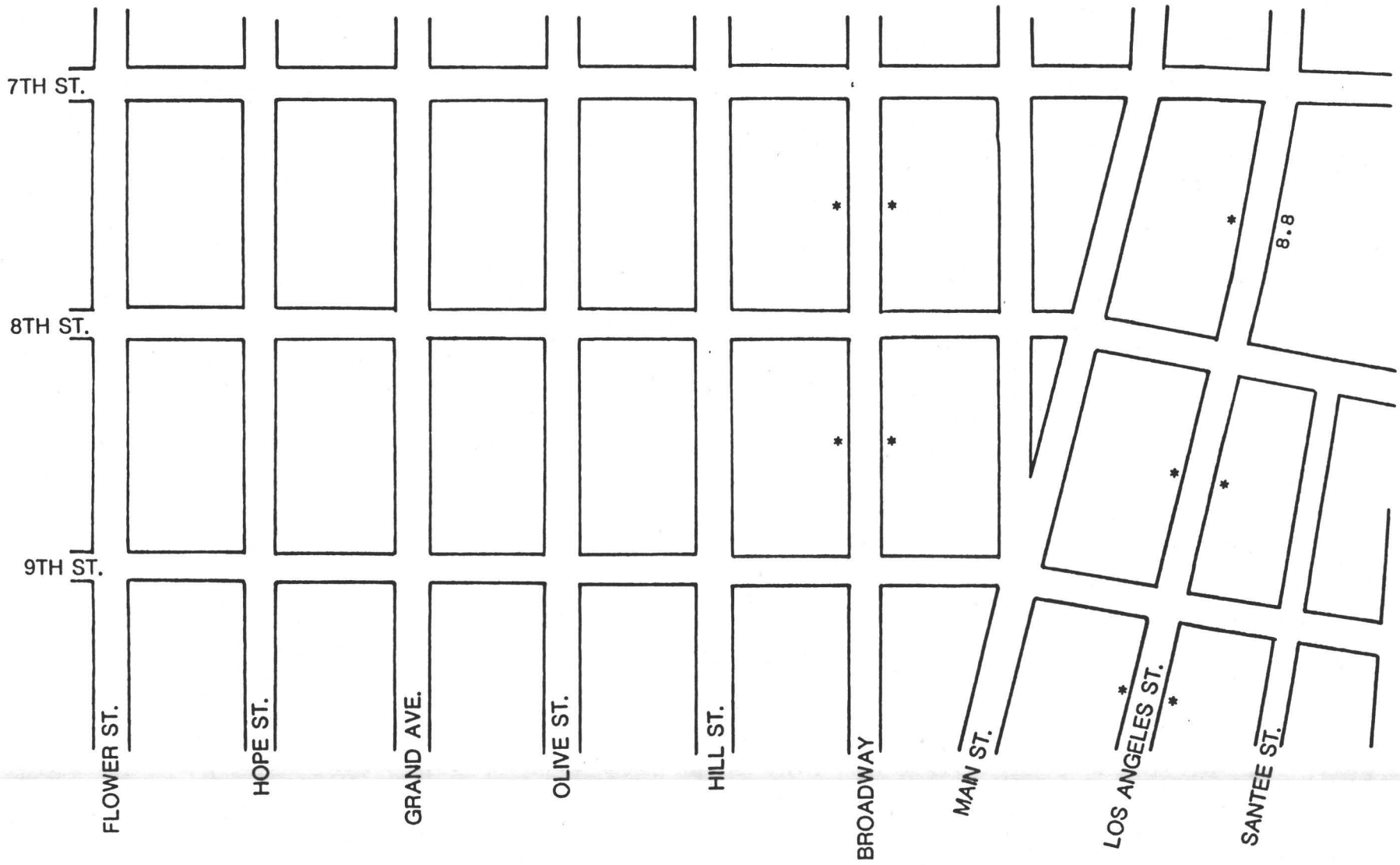
* EXISTING WIDTH IS ADEQUATE

EFFECTIVE WIDTH NEEDED -- EXISTING CONDITIONS/ MIDDAY PEAK HOUR

BARTON ASCHMAN ASSOCIATES, INC.

* EXISTING WIDTH IS ADEQUATE

FIGURE D-2



EFFECTIVE WIDTH NEEDED -- EXISTING CONDITIONS/MIDDAY PEAK HOUR

BARTON ASCHMAN ASSOCIATES, INC.

* EXISTING WIDTH IS ADEQUATE

FIGURE D-3

EFFECTIVE WIDTH NEEDED -- EXISTING CONDITIONS/P.M. PEAK HOUR

BARTON ASCHMAN ASSOCIATES, INC.

*EXISTING WIDTH IS ADEQUATE

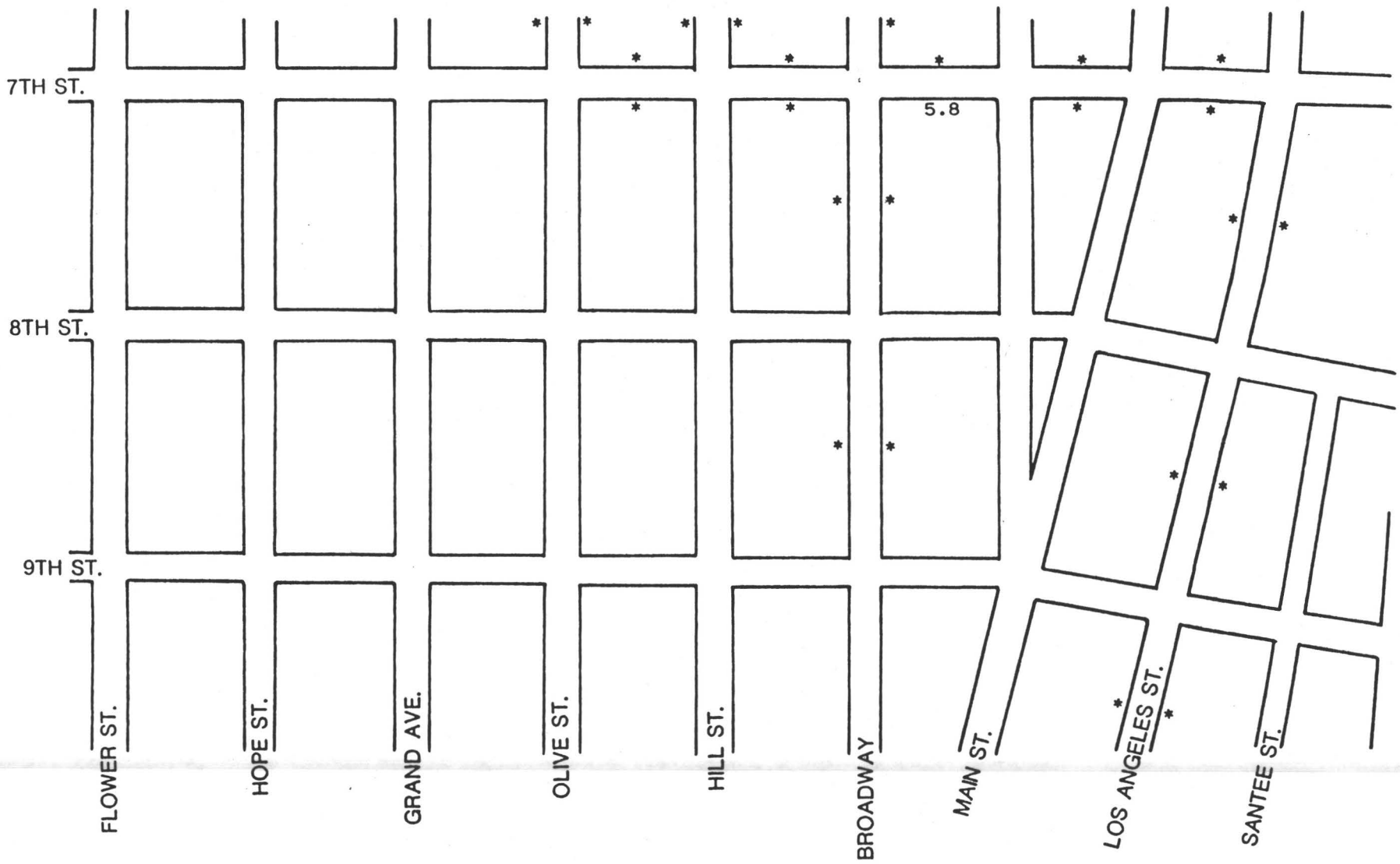
FIGURE D-4

EFFECTIVE WIDTH NEEDED--EXISTING CONDITIONS/P.M. PEAK HOUR

BARTON ASCHMAN ASSOCIATES, INC.

*EXISTING WIDTH IS ADEQUATE

FIGURE D-5



EFFECTIVE WIDTH NEEDED -- EXISTING CONDITIONS/P.M. PEAK HOUR

BARTON ASCHMAN ASSOCIATES, INC.

*EXISTING WIDTH IS ADEQUATE

FIGURE D-6

EFFECTIVE WIDTH NEEDED -- MIDDAY PEAK HOUR/1985-1989 PROJECTS

BARTON ASCHMAN ASSOCIATES, INC.

* EXISTING WIDTH IS ADEQUATE

FIGURE D-7

EFFECTIVE WIDTH NEEDED -- MIDDAY PEAK HOUR/ 1985-1989 PROJECTS

BARTON ASCHMAN ASSOCIATES, INC.

* EXISTING WIDTH IS ADEQUATE

FIGURE D-8

EFFECTIVE WIDTH NEEDED -- MIDDAY PEAK HOUR/1985-1989 PROJECTS

BARTON ASCHMAN ASSOCIATES, INC.

* EXISTING WIDTH IS ADEQUATE

FIGURE D-9

EFFECTIVE WIDTH NEEDED -- P.M. PEAK HOUR/1985-1989 PROJECTS

BARTON ASCHMAN ASSOCIATES, INC.

* EXISTING WIDTH IS ADEQUATE

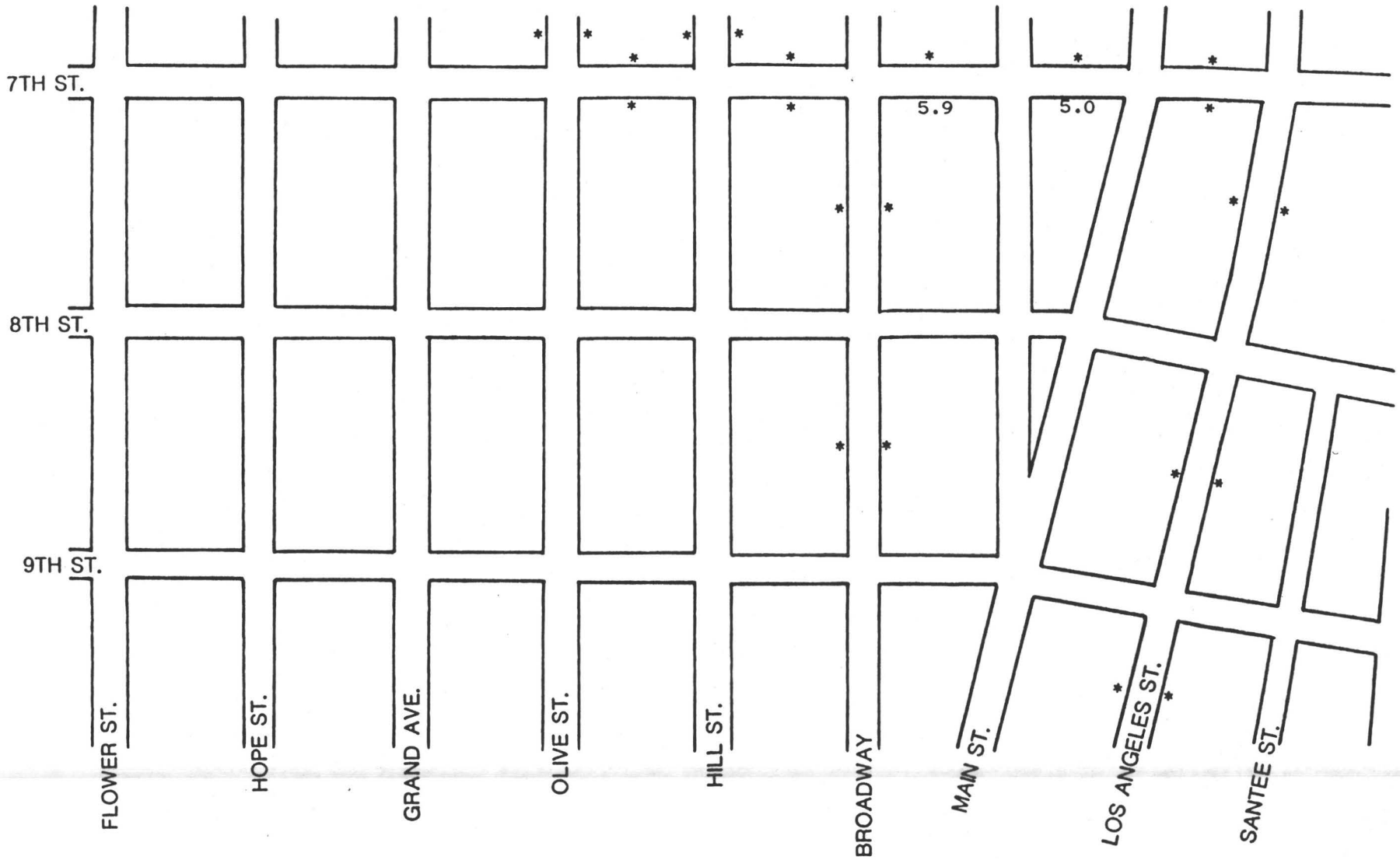
FIGURE D-10

EFFECTIVE WIDTH NEEDED -- P.M. PEAK HOUR/1985-1989 PROJECTS

BARTON ASCHMAN ASSOCIATES, INC.

* EXISTING WIDTH IS ADEQUATE

FIGURE D-11



EFFECTIVE WIDTH NEEDED -- P.M. PEAK HOUR/1985-1989 PROJECTS

BARTON ASCHMAN ASSOCIATES, INC.

* EXISTING WIDTH IS ADEQUATE

FIGURE D-12

EFFECTIVE WIDTH NEEDED -- MIDDAY PEAK HOUR/1985-1995 PROJECTS

BARTON ASCHMAN ASSOCIATES, INC.

FIGURE D-13

* EXISTING WIDTH IS ADEQUATE

EFFECTIVE WIDTH NEEDED -- MIDDAY PEAK HOUR/1985-1995 PROJECTS

BARTON ASCHMAN ASSOCIATES, INC.

* EXISTING WIDTH IS ADEQUATE

FIGURE D-14

EFFECTIVE WIDTH NEEDED -- MIDDAY PEAK HOUR/1985-1995 PROJECTS

BARTON ASCHMAN ASSOCIATES, INC.

* EXISTING WIDTH IS ADEQUATE

FIGURE D-15

EFFECTIVE WIDTH NEEDED -- P.M. PEAK HOUR / 1985-1995 PROJECTS

BARTON ASCHMAN ASSOCIATES, INC.

* EXISTING WIDTH IS ADEQUATE

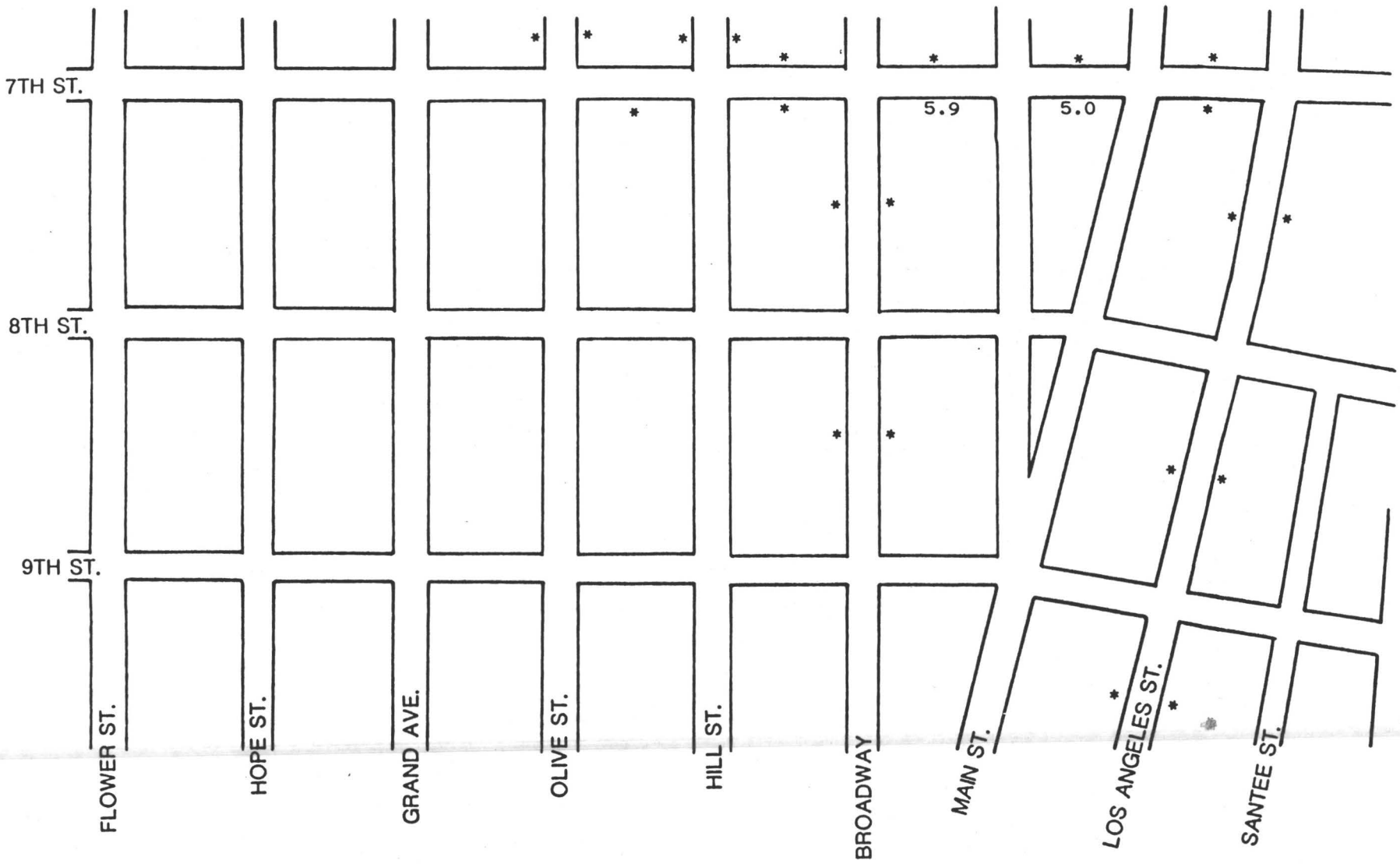
FIGURE D-16

EFFECTIVE WIDTH NEEDED -- P.M. PEAK HOUR/1985-1995 PROJECTS

BARTON ASCHMAN ASSOCIATES, INC.

*EXISTING WIDTH IS ADEQUATE

FIGURE D-17



EFFECTIVE WIDTH NEEDED -- P.M. PEAK HOUR/1985-1995 PROJECTS

BARTON ASCHMAN ASSOCIATES, INC.

* EXISTING WIDTH IS ADEQUATE

FIGURE D-18