

**Multiple Roadway Boulevards:  
Case Studies, Designs, and Design Guidelines**

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Working Paper  
UCTC No 300

**The University of California  
Transportation Center**

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Berkeley, CA 94720

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## I. INTRODUCTION

This study and report was born of experience with boulevards and — following research on the safety characteristics of such roads — driver and pedestrian behavior on them, their physical design qualities, and existing standards and norms that effectively govern their construction, develops a comprehensive set of design guidelines for their future construction and use

The research and design guidelines are focused on boulevards of a particular type, ones with multiple roadways. These are streets characterized by a central roadway of at least four lanes for generally fast and non-local traffic, separated from local and pedestrian traffic lanes on either side by tree-lined medians. The medians can be of various widths, sometimes nothing more than planting strips, or they may contain walks, benches, transit strips, bike paths, and even horse trails. The local access ways are narrow and have one through lane and one or two lanes for parking. The sidewalks may be wide and have their own line of trees, but often may be rather narrow

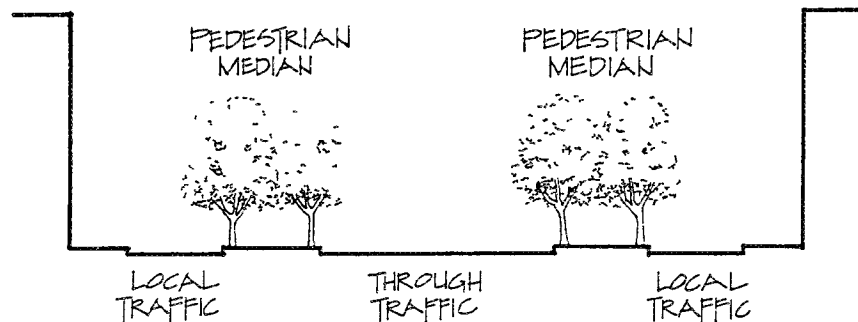


Figure 1.1. The Form of Multiple Roadway Boulevards

Multiple roadway boulevards are designed to be multi-functional, and to accommodate different types of traffic — fast, slow, pedestrian, and sometimes bicycle — all within the same right-of-way. They are balanced streets that provide for the needs of many users

Despite personal experience in the United States and Europe on delightful boulevards to the contrary, boulevards are generally considered dangerous streets because of their multi-functionality — specifically because of their complicated intersections that can permit many apparent turning and weaving conflicts. They are the streets that seem most frowned upon by present-day road design standards and norms. And yet, this street type directly addresses the functional problems posed by the relationship between different types of movement and access on major urban streets. We suspected that boulevards of this type are unduly maligned, even though they have offered and continue to offer a setting for gracious urban living, and may answer some pressing current problems of streets and cities.

And so this research began

Initially, a number of research tasks were carried out to gain a more full understanding of boulevards and their relative safety. These included: an analysis of accident and traffic volume data on selected boulevards and nearby central streets; detailed measurements of the physical qualities of 19 boulevards (eight in the U.S. and eleven in two European cities), counts of pedestrian and vehicular traffic on the

boulevards studied; extended observation and documentation of behavior that included time-lapse and video filming; and a study of existing rules, guidelines, and norms that govern the design of boulevards today, that determine their characters, and that, for all intents and purposes, make it impossible to recreate the best of them. All of this research and accompanying analysis is contained in the report, "Boulevards: A Study of Safety, Behavior, and Usefulness," published in 1994.<sup>1</sup> In addition, a video-film, "Boulevards: Good Streets for Good Cities,"<sup>2</sup> presents both the research and the findings of the initial research in a more visual manner than does the report.

Basically, the initial research showed that well-designed multiple-roadway boulevards are as safe as other major roadways carrying similar amounts of traffic, despite having intersections with many more potential conflict points. It seems that people — pedestrians and drivers alike — behave with more caution when movement choices are many and situations are complex.

The best boulevards are characterized by a strong and extended "pedestrian realm" where the side access roads are clearly separated from the center roadway and are narrow, where the medians have closely spaced trees and other facilities and functions on them; and where, on the whole, there is a combination of design factors, functions, and activities that permit pedestrians to consider the access road area as their realm. On the other hand, boulevards with wide access roads and long blocks are generally associated with higher speeds, more mid-block crossings by pedestrians, and more accidents.

In general, street trees, a crucial element to the establishment of the pedestrian realm on successful boulevards, are less of a barrier than other objects placed at street intersections and less of a barrier than parked or stopped vehicles, whose existence is inevitable.

People on boulevards, it was shown, generally follow the rules of traffic, but will take advantage of opportunities that may be against the rules if doing so is perceived as being safe.

Finally, boulevards can work well for major commercial streets, residential parkways, or a mix of residential and commercial uses. Their form permits the street to change as the context of the city changes around it.

During the measurement, observation, and analysis phase of the initial research it became clear why certain boulevards did not work well and why they might have high accident rates. This was particularly true of the Grand Concourse in the Bronx and Queens Boulevard in Queens. It became apparent that these streets would be "naturals" as case studies to test design guidelines and to help determine those guides in the first place.

This study and report, then, following upon the initial research and analysis, has the purpose of developing new design guidelines for multiple roadway boulevards in a variety of urban contexts. The guidelines were developed through the design of a number of existing and potential boulevards, which are presented here as case studies to illustrate the guidelines, and to show with some specificity what is meant by appropriate design for such streets.

## Methodology

The use of case studies of existing boulevards or other streets in contexts where boulevards seem appropriate presented opportunities to develop design guidelines that could grow from real-world situations. Working with case studies served several purposes: first, using existing streets permits addressing design issues holistically and intuitively, integrating previously gained knowledge of boulevards and experience of them into new designs. It was then possible to analyze issues that arose during design and the resultant solutions, and to arrive at general principles about good boulevard design. Second, the case study method could serve as a useful tool in soliciting feedback from practicing professionals who are charged with designing, approving, and maintaining these kinds of streets. In discussions with professionals, an attempt would be made to simulate a situation where a boulevard was proposed for a particular street as a solution to existing problems, or as an enhancement and improvement. Hopefully, these discussions and feedback would insure that crucial issues of designs, as would be reflected in the guidelines, would not be overlooked. Also, the discussions with professionals over specific streets might serve to delineate areas of conflict among research findings and proposals and the existing professional culture. Simply put, previous experience suggested that practicing professionals had a bias against boulevards that was based more on theory than on fact. It was worthwhile to find out if this held true, especially in light of new research that might be contrary to expectations. Also, such discussions might pinpoint areas of necessary new research that could resolve conflicts. Finally, the design case studies could serve as a source of examples illustrating the design guidelines.

## Choice of Case Studies

The choice of particular case study streets is described at some length in Chapter II. Suffice it to say here that the choice was to include a range of situations where boulevards are or could be useful, communities where cooperation with local officials was possible, and situations where a wide range of design issues was likely. Time and money constraints dictated that the number of case designs would be limited and that extensive travel would not be possible.

## Case Study Design as a Method of Elaboration of Analytical Knowledge into Design Precepts

Designing streets as boulevards, where they are appropriate, is a method of evolving theoretical knowledge into practical precepts. The results of the first phase of the study have provided analytical understanding of existing boulevards, and knowledge of where and why they work or fail to do so. Applying this knowledge to other streets, and generalizing it into general precepts, is a different matter. It is a trial-and-error method, in which a design is created, checked according to knowledge and experience, and improved and fine-tuned until it has the same "feel" as successful boulevards that have been studied and are well known. It is a procedure based on adaptation of good real-world models to new situations. By reflecting on the design process, it was possible to identify issues and the sequence of meeting them in the preparation of the designs.

## Presentation to City Officials

The presentations of the case study designs to city officials served to ground the guidelines in the reality of city planning and street design practice. There was a danger otherwise of wandering too far from the reality of real-world issues and accepted practices in American cities. Further, it was important to assess the openness of professional practice to change, especially in light of the research on boulevards and in response to recent challenges to the primacy of the automobile. One intention of the dialogue with city officials was to sharpen some of the issues in contention and consider counter-arguments. It was also important to try to pinpoint the issues of concern to city officials who need to approve such designs so that they might be addressed in the guidelines.

It was important that the responses of the officials, the questions and assertions made to them, and questions and arguments associated with the designs be recorded as impartially as possible. In all of the meetings (except one) an observer, who was not involved in the preparation of the case study designs, was observing both the reactions of city officials and those of the designers, and acted as a recorder.

Responses to the designs were considered by location and context to determine whether the prospects for boulevards are better in particular cities and locations, and according to professional affiliation and position within a city hierarchy to see if there are particular groups and positions that enable some professional people and laymen to be more open to the ideas presented through these designs.

## Refining the Guidelines

Finally came the task of refining and elaborating the guidelines. These constitute the core of this report. A guiding principle in writing the guidelines has been to make them minimal but sufficient: throughout, the minimum that is necessary to design and build good boulevards has been stressed, while elaborations have been suggested, focusing on a sequence of necessary decisions. The guidelines are based on all of the current research into boulevards; observations and analyses on existing boulevards that were performed in the first phase of this research; the case study design exercises, the meetings and responses of the local officials; and many discussions and assessments of what all of the data, questions, and responses mean.

## What Follows

The design case studies for seven existing or would-be multiple roadway boulevards follow immediately upon this introduction. Alternative designs are given for four of the streets. They are all described and discussed, including a description of the existing streets and how they work. These designs were the basis of the presentations to and discussions with local professionals which are reported upon next. A large section, "Guidelines for the Design of Boulevards," then follows. This section is the culmination of the research and analysis to date and deals with the most important considerations for future boulevard design. A conclusionary chapter that reflects on the experience of two years of research and discusses the prospects for boulevards draws this report to a close.

## II. THE CASE STUDIES

The initial research carried out as part of this study involved field observations on a number of existing boulevards and analysis of traffic and accident data. It concluded with general observations, or hypotheses, about why some boulevards work well and some work poorly. These observations, summarized in the foregoing introduction, were based partly on hard data and partly on intuition borne from the researchers' experience. The intention of this phase of the research is to refine these observations, and the ideas about the physical characteristics of good boulevards that derive from them, into a set of workable design guidelines that may be used for retrofitting existing boulevards, retrofitting existing non-boulevard streets into boulevards, and designing new boulevards. In going about this, it seemed important to involve practicing transportation professionals in order to get their feedback and to make sure their concerns were addressed.

A case study approach, whereby individual boulevard design proposals were developed for a number of existing streets, was used as a means of both refining the guidelines and eliciting responses. Case studies allowed the researchers to test the evolving guidelines, to explore how existing streets might be adapted into boulevards using the guidelines, and to look for solutions to problems apparent on some of the boulevards observed in the initial study which cried out for solutions. They also allowed the researchers to get feedback from practicing professionals on the appropriateness of the design guidelines as they were being developed and to do this not in a purely abstract way, but in relation to specific design proposals for streets they would know, streets in their communities. Specific proposals, for streets known to local professionals, in known urban contexts, and for which they might have vested interests, might elicit stronger responses, even more critical ones, than would more abstract guidelines. That, at least, was the anticipation.

This chapter presents the case study designs and the responses of practicing professionals to them. Five case studies, encompassing seven streets in five cities, are included.

The chapter is divided into five sections. First is a description of the case study selection process, followed by a section describing the methodologies used to develop the design proposals for the case studies and to elicit responses to them from practicing professionals. The third section, which makes up the bulk of the chapter, consists of street-by-street descriptions of the case studies and summaries of the responses. Included are illustrative drawings for each street that show the urban context, existing conditions, and the boulevard design proposals. In the fourth section, the responses to all the case studies are compiled and analyzed. This is followed by conclusions.

### Case Study Selection

The streets selected for case study designs were chosen with three criteria in mind. The first criteria was to select streets that might make sense as boulevards, that are wide enough to accommodate a boulevard configuration comfortably, and for which a boulevard configuration might solve existing prob-

lems or respond to new challenges. The second criteria was to select a variety of street types in a variety of urban contexts (ranging from heavily built-up urban streets to wide, high-traffic suburban streets) in order to illustrate a wide range of possible boulevard uses and configurations. The third extremely important criteria was to select streets in cities where planning and transportation officials were open to consideration, if only hypothetical, of the redesign of streets in their communities as part of this research, and to participate in meetings where alternative configurations would be discussed.

Two of the streets selected — the Grand Concourse and Queens Boulevard — are existing unsafe boulevards located in New York City. They were studied in Phase One of this study and determined to be unsafe streets and unsuccessful as boulevards, primarily because of certain physical characteristics they have in common. City officials would like to make these streets safer and so were very interested in alternative design ideas.

The other five case study streets are not currently boulevards but are streets that, because of their location and importance, are possible candidates to be boulevards. They are located in cities in or near the San Francisco Bay Area — cities familiar to the researchers and easily accessible for field research and meetings with officials.

Geary Boulevard in San Francisco was chosen to illustrate how a major arterial street in a large city might be transformed into a boulevard. In addition, it was chosen because it is currently the subject of a transit planning study investigating the feasibility of putting a light-rail line on the street. This case study allowed an opportunity to explore boulevard configurations that incorporate rail transit, and was particularly challenging because of the relatively narrow street right-of-way — at 125 feet Geary is the narrowest of the case study streets.

Capitol Mall in Sacramento was chosen because it is a special ceremonial street for which a boulevard configuration would be appropriate. It runs from the Sacramento River to Capitol Park on axis with the California State Capitol Building.

West Capitol Avenue in West Sacramento was chosen to illustrate how a small city commercial strip might be improved to handle both local and commercial traffic with a boulevard configuration.

Paseo Padre in Fremont was selected to illustrate how a suburban commercial arterial street might be made more urban with a boulevard configuration.

Mowry Avenue, also in Fremont, was selected to illustrate how a suburban residential arterial with frontage roads could be made into a better residential street if redesigned as a boulevard.

In sum, the case study streets vary in width from 125 feet to 200 feet and represent large, medium, and small city contexts, urban and suburban contexts; and residential, mixed-use, and commercial streets.

## Methodology

This section describes the methodologies used to develop the boulevard redesigns and to elicit responses to the redesigns from practicing professionals.

## Redesign Methodology

For each case study street selected, the researchers developed boulevard design proposals incorporating the knowledge gained in the first year of research. Inter-related physical characteristics that were found to be crucial to good boulevard design and the creation of pedestrian realms, such as closely spaced trees on the medians and narrow side-access roads, were always included. Other physical characteristics that contribute to good boulevard design and enhance pedestrian realms were also incorporated as seemed appropriate and as space allowed, including special pedestrian amenities on the medians such as paving, benches, pedestrian-scale light fixtures, special planting, and bicycle paths.

With the exceptions of Paseo Padre in Fremont and West Capitol Avenue in West Sacramento, where it seemed unnecessary, two design proposals were prepared for each street. Of the two proposals, generally one is a minimal-intervention design while the other suggests more intensive intervention. Details such as tree-spacing and parking configurations are varied between schemes in order to test the effect of these differences, in terms of how the street "feels," and to see if such differences would influence reviewers' perceptions.

For easy visibility, designs were prepared at a scale of one inch to 20 feet in plans and one-quarter inch to one foot in section.

It should be noted that for each case study street many variations in design detail are possible. The proposals included here, for the most part, should be considered as general design approaches rather than as detailed design solutions.

## Response Elicitation Methodology

In each city where possible case studies had been identified, meetings were sought with officials responsible for traffic and transportation planning. Initial contact was made by phone, at the highest possible level of the department responsible for traffic and transportation planning and engineering, to arrange a meeting at which the project as a whole and the specific boulevard proposals would be presented. Initial discussions, then, were with operating heads of departments of transportation, or of departments of public works or civil engineering. In one case, the initial contact was made through a known colleague who then assembled the group to whom the designs were presented. In all, contacts were made with officials in six cities (One city chose not to participate.) The contact person was asked to assemble for the meeting whatever professional staff seemed appropriate, with some stress being placed on traffic engineers and transportation planners.<sup>3</sup>

In each case, a two-hour meeting was arranged in offices of the city in question. The number of staff attending ranged from three (Fremont and Sacramento) to nine (New York City). The New York staff had been given copies of the initial research report in advance; the rest had not.

At each meeting, the assembled staff people were advised, by way of background, of the nature of the research, its funding sources, and its purposes, including the charge to prepare design guidelines.



for multiple-roadway boulevards. They were advised of the existence of the first research report and of the completed twenty-minute video that grew from the research. In one case, New York City, the video was shown. Basic conclusions of the research were then presented, with some emphasis given to the importance of the pedestrian realm on successful boulevards.

At this point, following responses to questions if there were any, a presentation was made of the existing street(s) under consideration and of the alternative boulevard design(s) prepared for it. Large-scale drawings of existing and suggested street plans (at 1 inch to 20 feet) and cross-sections (at 1/4 inch to 1 foot) were on the walls, as well as, in some cases, turning movement diagrams.

Following this presentation invitees were asked, first, for questions as to the substance of the proposals and then for their responses and critiques as to the workability of the boulevard proposals

If comments on significant aspects of the design were not forthcoming spontaneously, questions were asked by the designers to elicit reactions. These included questions pertaining to the workability of the intersections, the turning and weaving movements, tree spacing, lane widths, and overall safety.

In every case, the two-hour meeting time was adequate. No discussion was cut off because of time constraints.

## The Case Studies

Following are street-by-street descriptions of each case study and summaries of the responses. Included are urban context maps of each street, and plans and sections showing existing and proposed physical dimensions, planting patterns, land uses, transit configurations, and the like. Drawings for each street are at the same scale so that all the designs are directly comparable

It should be noted that existing dimensions derive from field pacing and as such are approximate.

Case Study #1

RENOVATION OF EXISTING UNSUCCESSFUL BIG CITY BOULEVARDS

The Grand Concourse, Bronx, New York City

Queens Boulevard, Queens, New York City

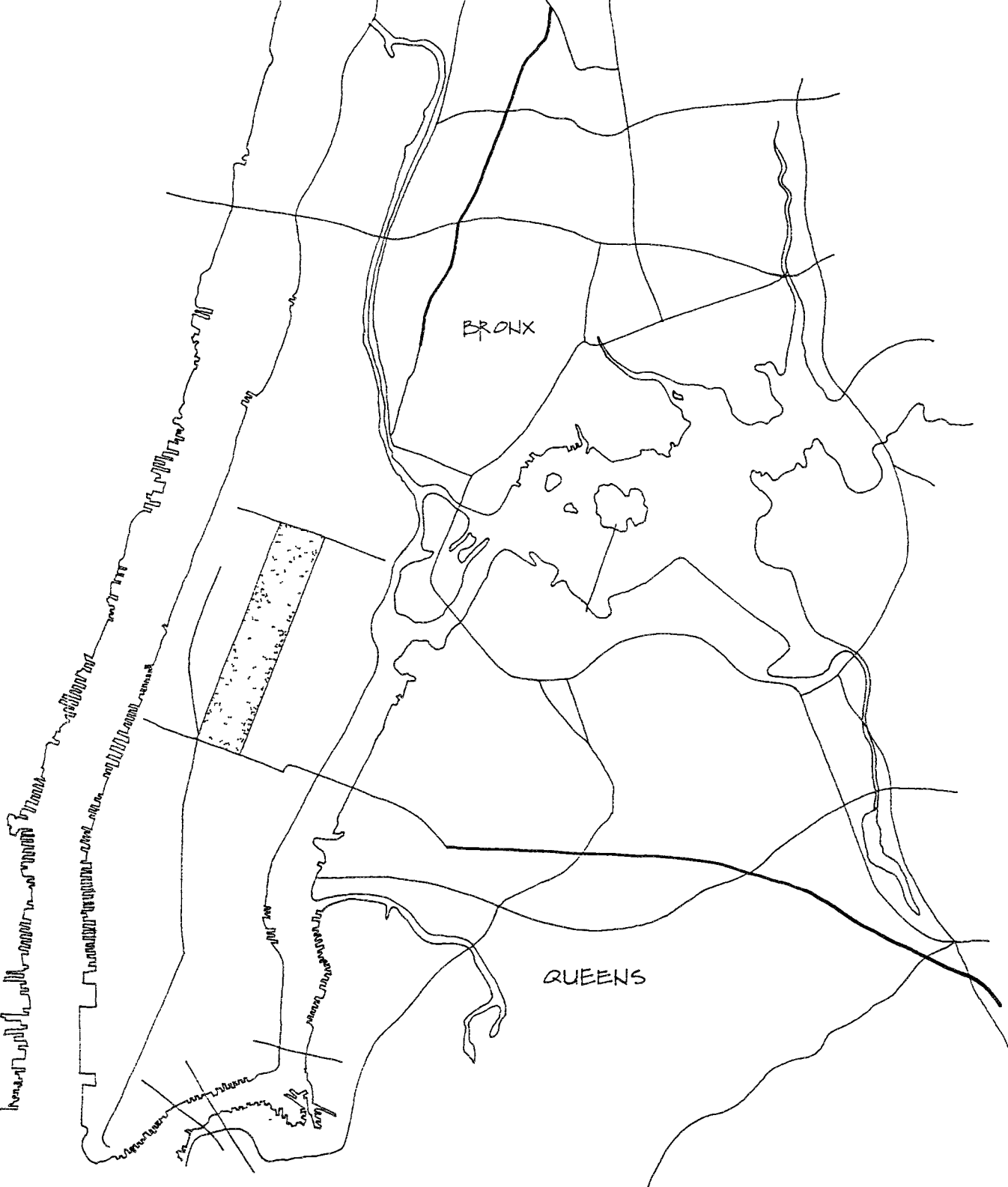


Figure 2.1. Urban Context Map of the New York Metropolitan Area  
Approximate Scale: 1:100,000

## Urban Context

The Grand Concourse and Queens Boulevard are both major arterial streets in New York City which run for long distances and carry very high volumes of traffic (Figure 2.1). Both have boulevard configurations and are considered to be among the most unsafe streets in New York. Research conducted in Phase One of this study suggests that the particular physical design characteristics of these streets may account for this status. Both have narrow medians sparsely planted with trees and wide access roads that carry two lanes of traffic. On both streets, almost as much through traffic uses the access roads as the center, and it moves almost as quickly. They both also have long blocks, which encourages fast traffic movement as well as jay-walking between intersections — a dangerous combination. Indeed, both streets do experience significant jay-walking and have greater pedestrian safety problems than other streets — they are rated first and second in New York city for pedestrian fatalities.

Of interest is that two other existing boulevards in New York City — Ocean Parkway and Eastern Parkway in Brooklyn — were found to be not less safe than normally configured streets. These streets both have wide medians, heavily planted with trees, and only one lane of traffic on the access roads. The differences between these two sets of streets, and how the differences affect safety, informs much of the guidelines.

The Grand Concourse is the major north-south throughway of the Bronx, running for about 4-1/2 miles from the Harlem River to Van Cortlandt Park in the North Bronx. It was built in the early 1900s with the intent that it would serve as a speedway or "concourse" connecting Manhattan with the newly established Bronx public parks, and help open up the Bronx for suburban development. It is located on a ridge, and most cross-streets are tunneled through the ridge and underneath the street — a design intended to facilitate fast movement on the Concourse.

Uses along the Grand Concourse are predominantly residential. The street is lined with densely built five- to six-story apartment buildings and some shops, usually clustered at corners. Socio-economically, the area is stable, but the street has declined considerably in its physical maintenance characteristics since the 1950s. Long a predominantly Jewish area, most of the surrounding neighborhoods are now occupied by Blacks and Hispanics.

Traffic volumes on the Grand Concourse are high, about 57,950 ADT.<sup>4</sup> A subway line runs below the street and a number of stops occur on it. It also serves as a major bus route. Pedestrian activity on the Concourse is high.

Queens Boulevard is the major east-west throughway in the borough of Queens, running for about six miles from the East River to the Van Wyck Expressway. It was built in the early 1900s with the intention that it would open up the then mostly rural Queens for suburban expansion. The street is lined for the most part with five- and six-story apartment buildings, many with ground floor stores and businesses, as well as lower-scale shopping areas and some strip development.

Queens Boulevard has an ADT of 37,654<sup>5</sup>. A subway line runs under it for part of its length, with a number of stops occurring on the street. It is also a main bus route. Pedestrian activity is low along most areas, but high at the concentrated commercial sections.

## The Grand Concourse

### *Existing Configuration (Figures 2.2 and 2.3)*

The Grand Concourse has a right-of-way of approximately 172 feet, and buildings along it are generally built to the property line. The center roadway is 50 feet wide, accommodating two lanes of traffic in each direction plus a left-turn lane (10-foot lanes). The access roads are 35 feet wide, allowing two lanes of traffic and one parking lane (11 5-foot-wide lanes). The paved medians are eight feet wide, and are generally planted in a random fashion with a variety of large and small trees. Some sections, however, are planted with closely spaced mature London Plane trees, remnants, perhaps, of an earlier planting scheme now lost. Much of the median paving is broken up by large grates covering vents for the subway that runs below the street. The sidewalks on either side are 20 feet wide and planted randomly with an assortment of trees. Star access to the subway occurs at the sidewalk, as do bus stops. Buses travel on the access roads.

Movement is restricted at intersections: traffic is not allowed to merge from the center into the access roads, or vice versa. Right-hand turns are not allowed from the center, nor are left-hand turns from the access roads. Transitions between the center and the access roads occur at mid-block breaks in the medians via "sleeves." The center, the access roads, and the cross-streets are all controlled by signal lights.

### *Opportunities*

The Grand Concourse is a street with potential to be a fine boulevard, primarily because of the active and diverse street life along it. It would be a much safer street, as well as a more pleasant one, if reconfigured with narrower access roads and wider medians. Such a configuration would create safer pedestrian realms, and might help to stimulate neighborhood revitalization. In addition, especially since the densely built residential neighborhoods surrounding the Grand Concourse offer little in the way of either public or private open space, there is an opportunity to use the street to provide public open space. Wide planted medians could create a kind of linear park on the Grand Concourse, similar to the linear parks created by the medians on Ocean Parkway and Eastern Parkway in Brooklyn.

### *Boulevard Redesigns*

Two design proposals were developed for the Grand Concourse, one a minimal-intervention design and the other a much more intensive reconfiguration. Both retain the existing center roadway width and traffic configuration (because the dimensions are adequate and work well and in order to save on implementation costs), and both eliminate the mid-block breaks in the medians (because the initial research suggests that such traffic sleeves may make boulevards less safe).

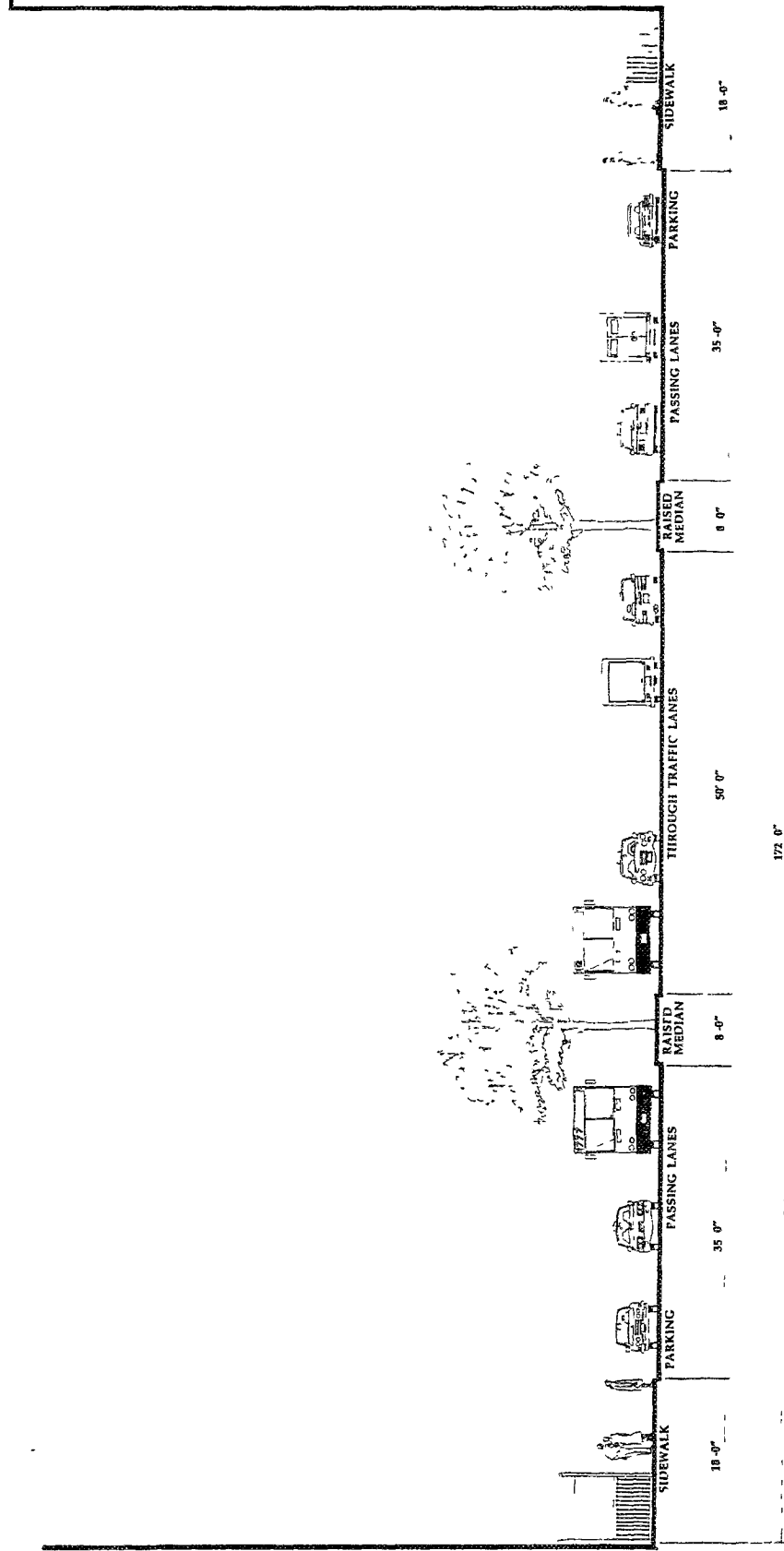


Figure 2.2. Grand Concourse Section: Existing Configuration

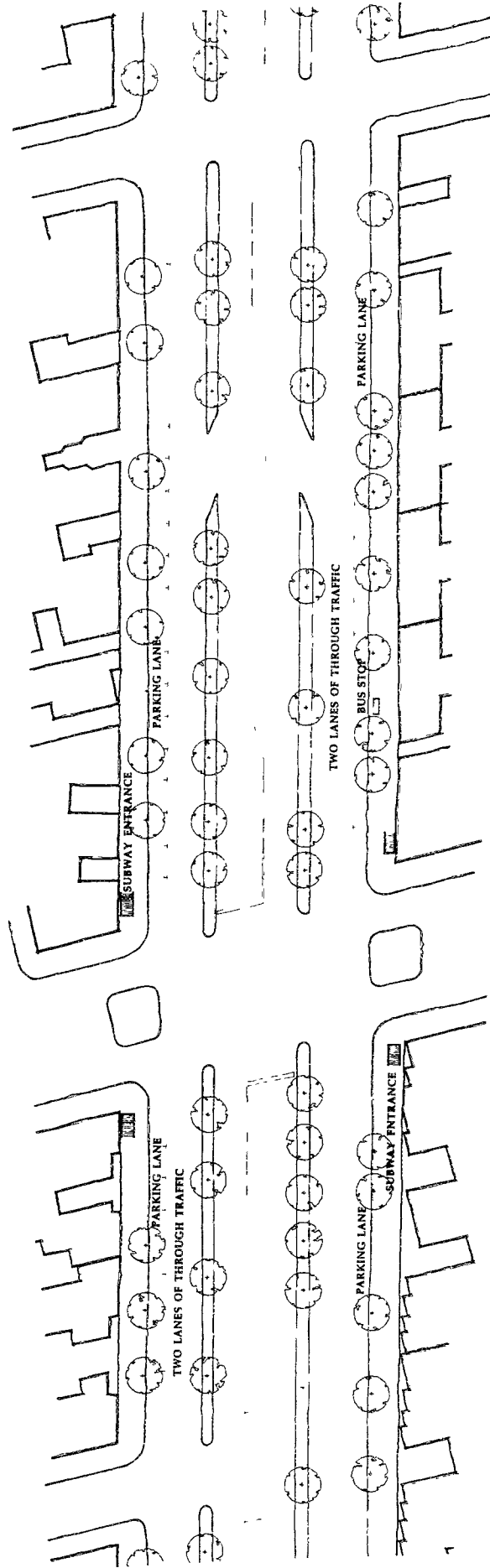


Figure 2.3. Grand Concourse Plan: Existing Configuration  
 Approximate Scale: 1" = 100'

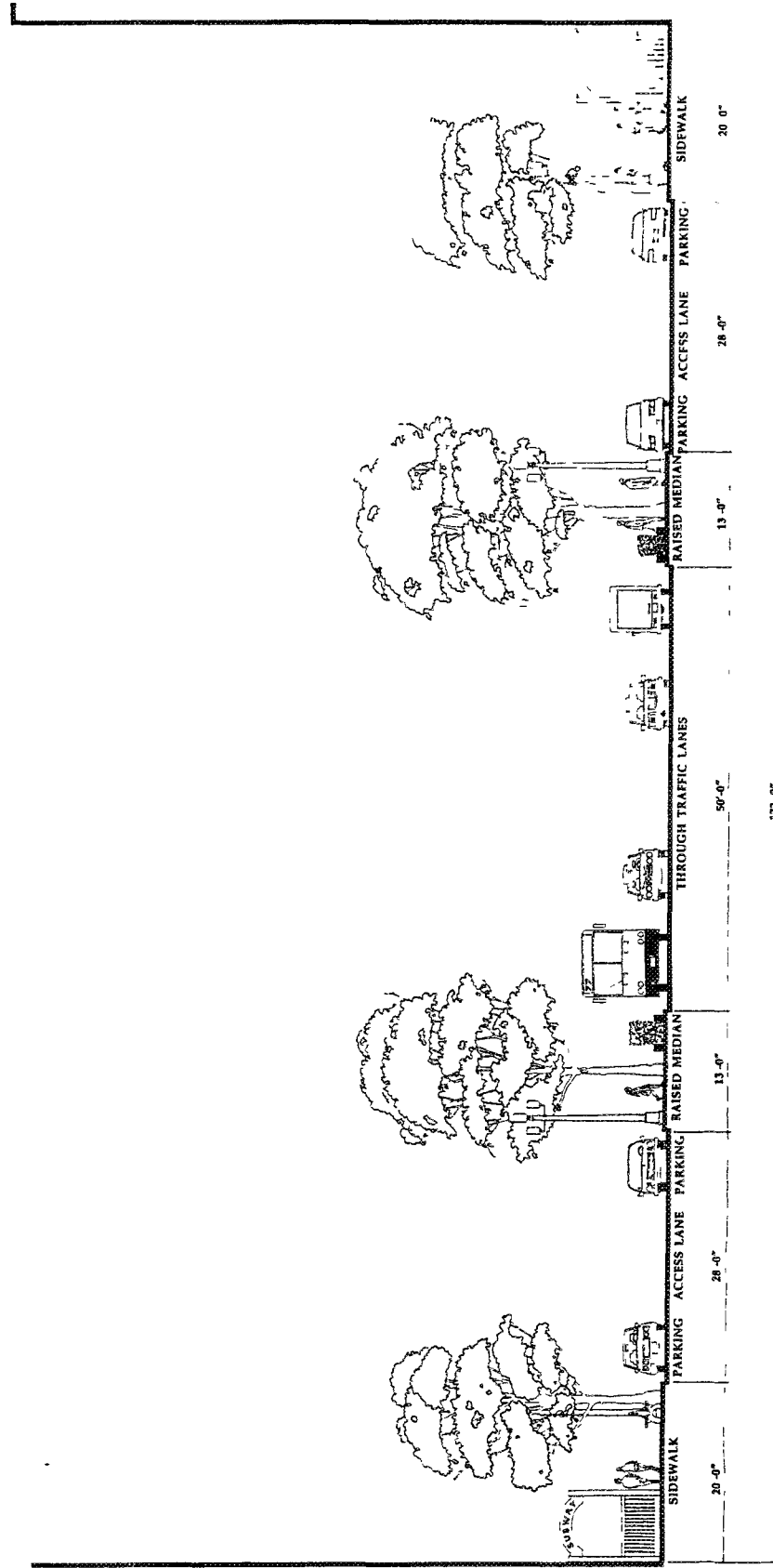


Figure 2.4. Grand Concourse Section: Redesign Alternate A

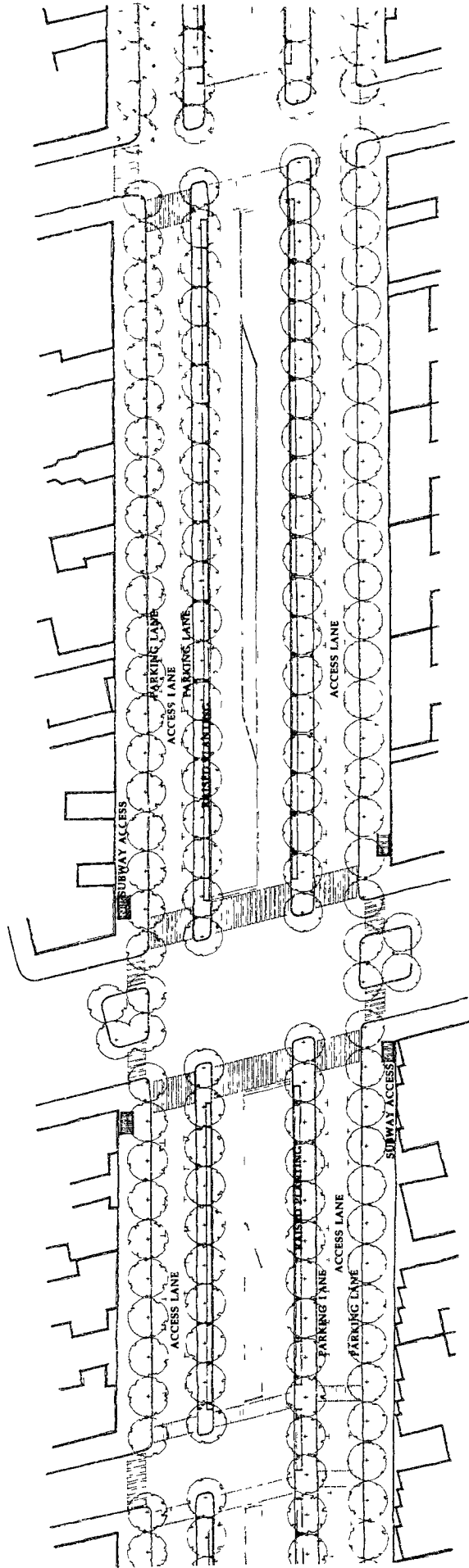


Figure 2.5. Grand Concourse Plan: Redesign Alternate A  
 Approximate Scale: 1" = 100'



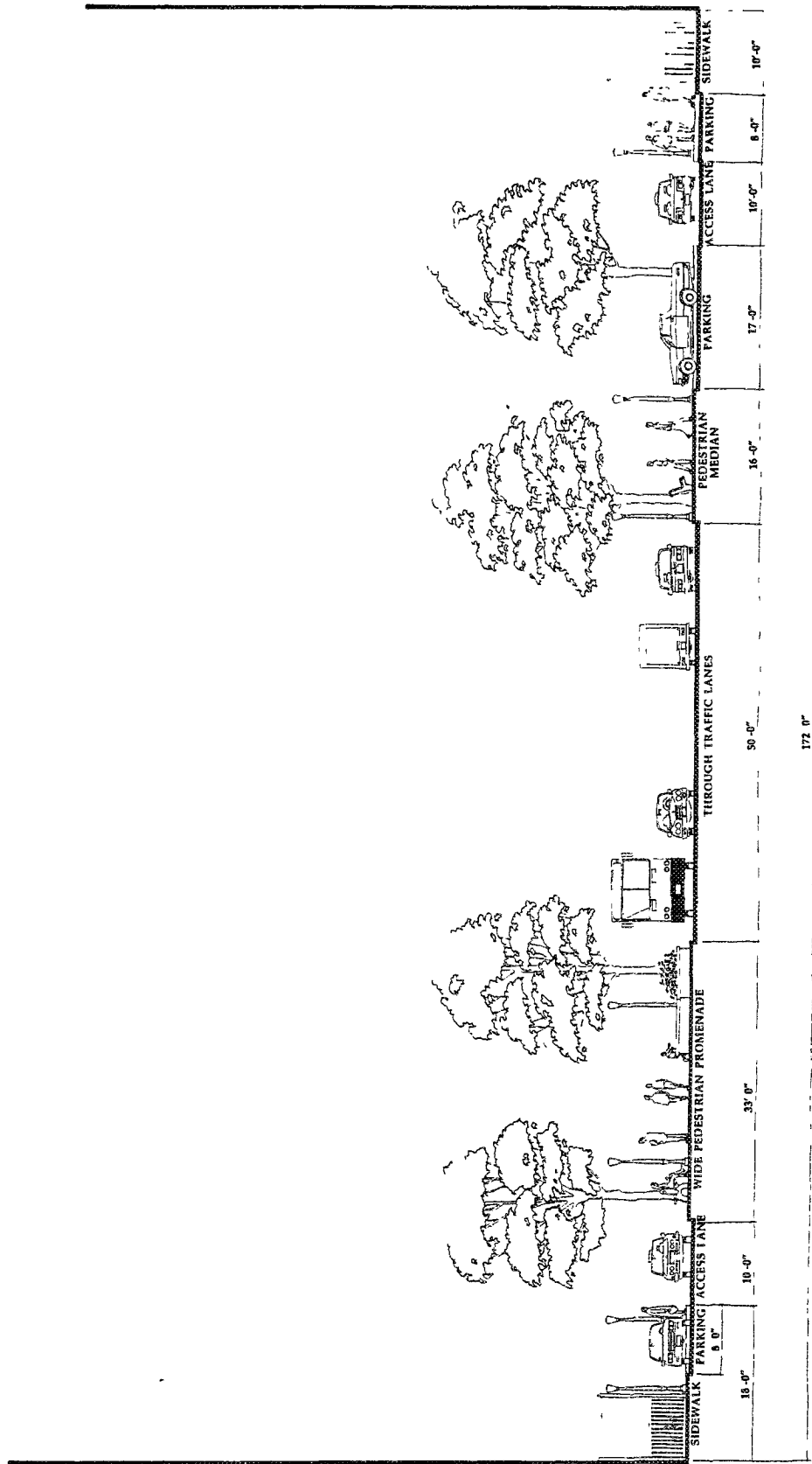


Figure 2.6. Grand Concourse Section: Redesign Alternate B

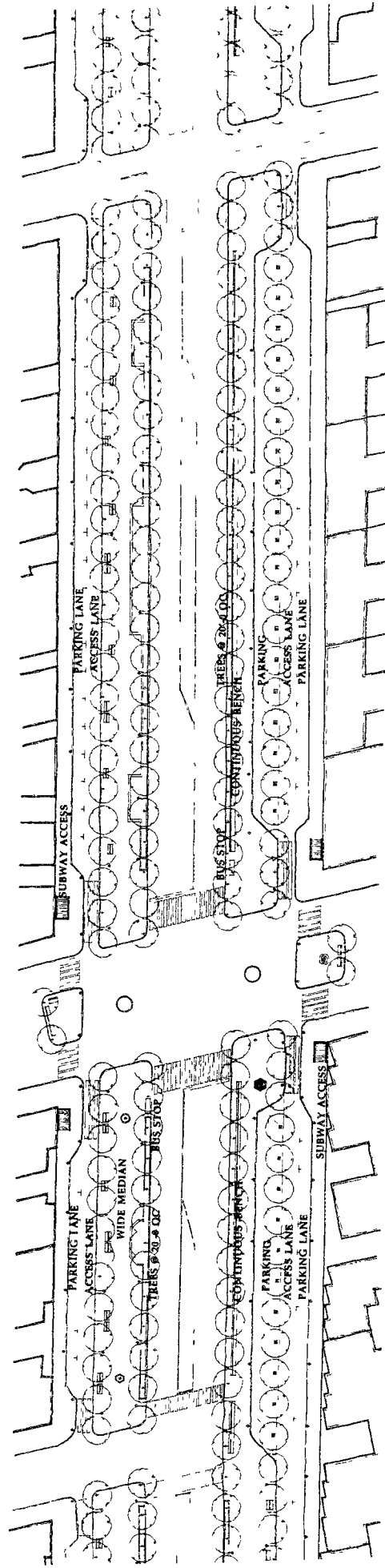


Figure 2.7. Grand Concourse Plan: Redesign Alternate B  
 Approximate Scale: 1" = 100'

### *Alternate A (Figures 2.4 and 2.5)*

This design is a minimal-intervention proposal. The center roadway and sidewalks remain as they are now, but the medians are widened and the access roads narrowed.

The combined pedestrian realm is 71 percent of the total right-of-way. The medians are widened to 13 feet and planted with a row of trees spaced at approximately 25-foot centers. They are paved and provided with pedestrian amenities such as pedestrian-scale light fixtures and benches. The outer edges of the medians are lined with raised planters and tall shrubs to discourage mid-block jay-walking. The access lanes are narrowed to 28 feet and reconfigured to have one traffic lane and two parallel parking lanes.

This design has some advantages—it keeps four curb lines intact, thereby minimizing implementation costs, while providing a maximum amount of parking and reasonably wide medians. On the other hand, it does not take full advantage of the opportunity available to provide the much needed public open space.

### *Alternate B (Figures 2.6 and 2.7)*

This design proposes a more intensive intervention and suggests a variety of possible configurations for the pedestrian realm. As in Alternate A, the center roadway remains the same but the medians are much wider and the access roads narrower.

The combined pedestrian realm is 73 percent of the total right-of-way. The medians are 33 feet wide and designed as pedestrian promenades with paving, light fixtures, benches, and planters. Two rows of trees, at 20-foot centers, line the edges of the promenades. To discourage mid-block jay-walking, the outer edges of the medians are lined with either a raised planter planted with high shrubs, or a continuous bench. The access lanes are 10 feet wide, with continuous parking on one side cut into the existing sidewalk. Where additional parking is desired, perhaps near commercial corners, cars also park diagonally between the trees on the medians. The level of these diagonal spaces is raised slightly above the level of the general roadway so that the median edge remains distinct.

The advantage of this design over Alternate A is that public open space and pedestrian amenities are provided in an area that badly needs them.

## **Queens Boulevard**

### *Existing Configuration (Figures 2.8 and 2.9)*

Queens Boulevard has a 200-foot right-of-way, currently configured with a divided 80-foot center roadway, 10-foot medians, 35-foot access roads, and 15-foot sidewalks. The center accommodates three lanes of traffic in each direction and alternating left-turn lanes in a median. The access roads allow two lanes of through traffic and one lane of parallel parking. The medians and sidewalks are sporadically planted with widely spaced trees. Subway access and bus stops occur on the sidewalks. Buses travel on the access roads.

### *Opportunities*

Queens Boulevard presents generally the same opportunities as the Grand Concourse. It has the potential to be a good boulevard because it is both a main traffic route and a local focal point. Like the Grand Concourse, it would be a much safer and more pleasant street if reconfigured to have distinct pedestrian realms. In addition, although the need here is perhaps not as acute as in the Bronx, there is an opportunity to provide community open space on widened medians. The wide existing right-of-way means that generous pedestrian realms could be easily provided.

### *Boulevard Redesigns*

Taking into account the extremely long length of Queens Boulevard, the two design proposals developed for the street suggest minimal intervention. Both leave the existing center roadway as is because, although it is wider than necessary, this would save substantially on implementation costs. For both designs, the combined pedestrian realm is 75 percent of the total right-of-way.

#### *Alternate A (Figures 2.10 and 2.11)*

This design proposes the least intervention necessary to create a good boulevard. The center roadway remains the same but the medians are widened and the access roads narrowed. The 20-foot-wide medians, planted with one or two rows of trees at 25-foot centers, are paved and provided with pedestrian-scale light fixtures and benches to encourage people to walk along them. Raised planters line their outer edge to discourage mid-block jay-walking. The access roads, narrowed to 25 feet, are reconfigured with one traffic lane and two parallel parking lanes. Existing sidewalks remain but are planted with trees like those on the medians.

The advantages of this design are that four existing curb lines are kept intact and a maximum amount of parking is provided, while at the same time generous pedestrian medians are provided.

#### *Alternate B (Figures 2.12 and 2.13)*

This design also retains the center roadway configuration but suggests a somewhat more intensive intervention, because both the medians and the sidewalks are widened. The medians, widened to 12 feet, are planted with a row of trees spaced at 21 centers, lined on their outer edges with raised planters to discourage mid-block jay-walking, and provided with benches and light fixtures. They widen with bulbs at intersections in order to facilitate pedestrian crossing. The access roads are narrowed to 24 feet and allow the same traffic configuration as Alternate A. Sidewalks are widened to 24 feet, planted with closely spaced trees at their outer edge, and lined with benches and pedestrian-scale light fixtures. It is intended that commercial activities — restaurant seating, browsing racks, and the like — would be allowed to spill onto the wide sidewalks.

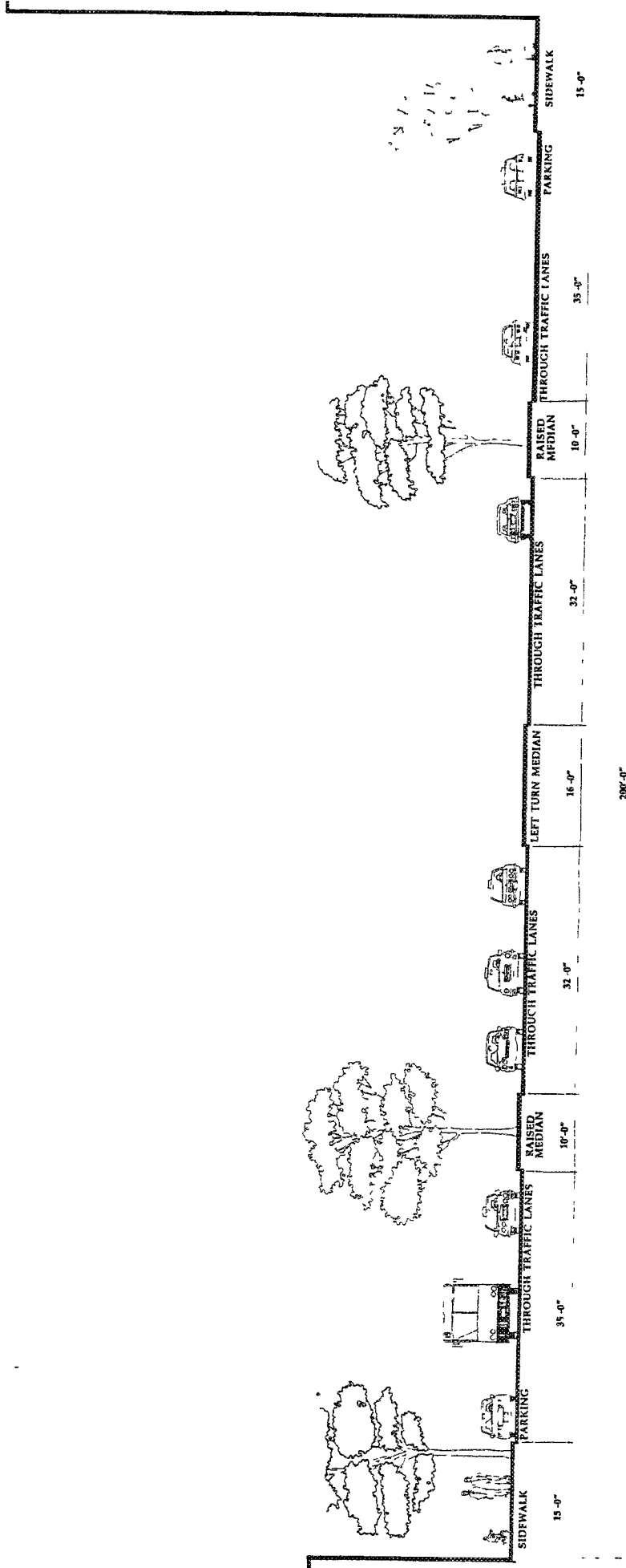


Figure 2.8. Queens Boulevard Section: Existing Configuration

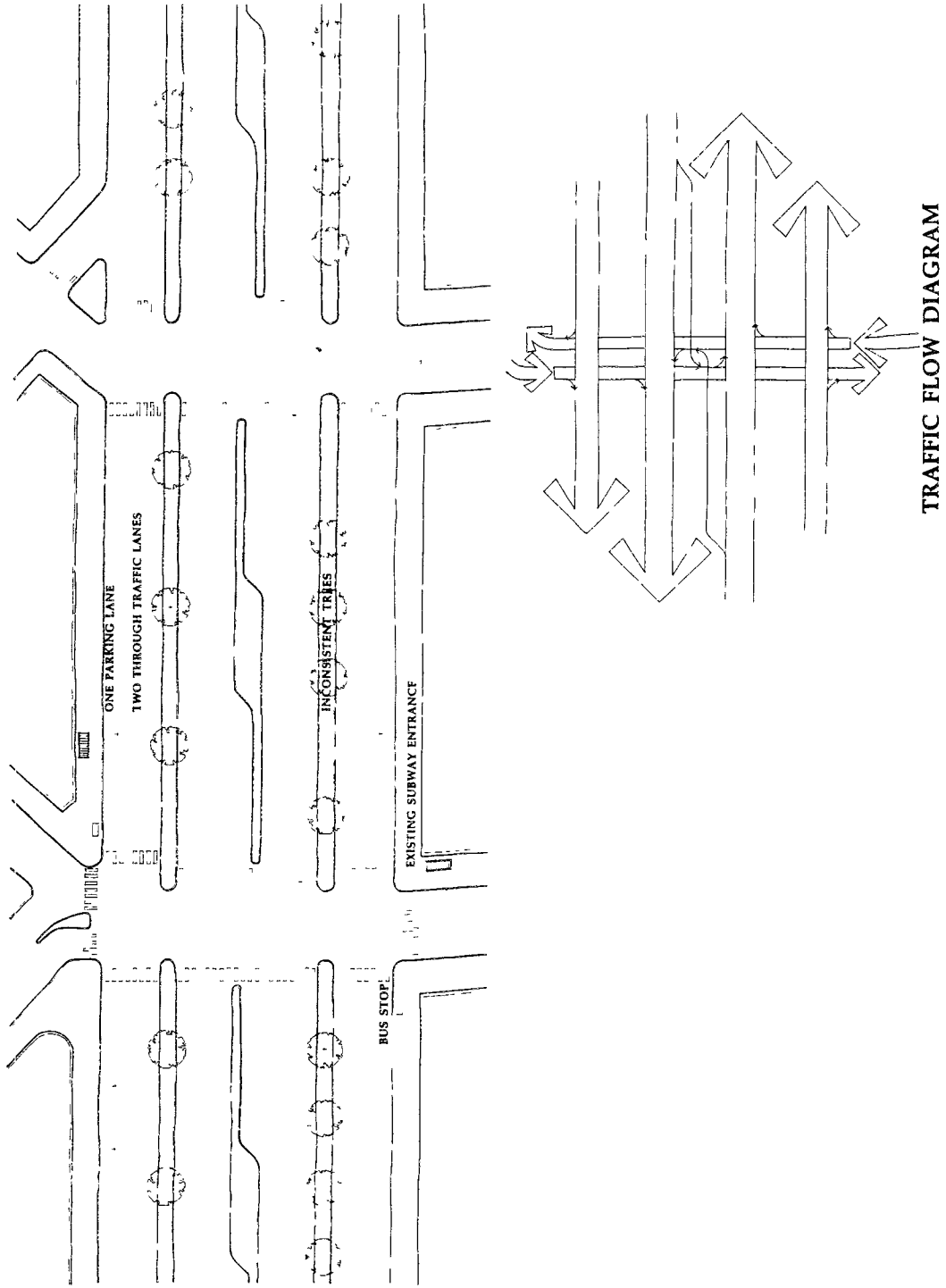


Figure 2.9. Queens Boulevard Plan: Existing Configuration  
 Approximate Scale: 1" = 100'



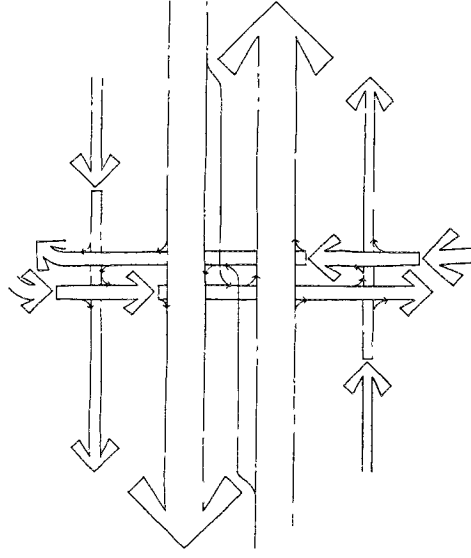
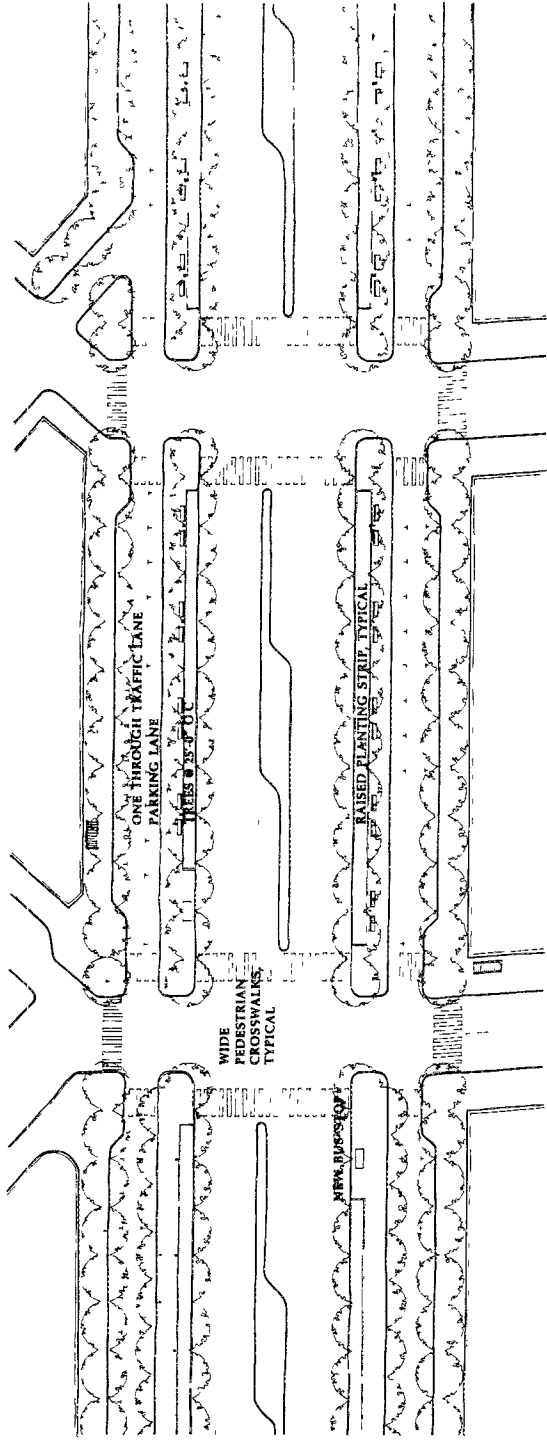
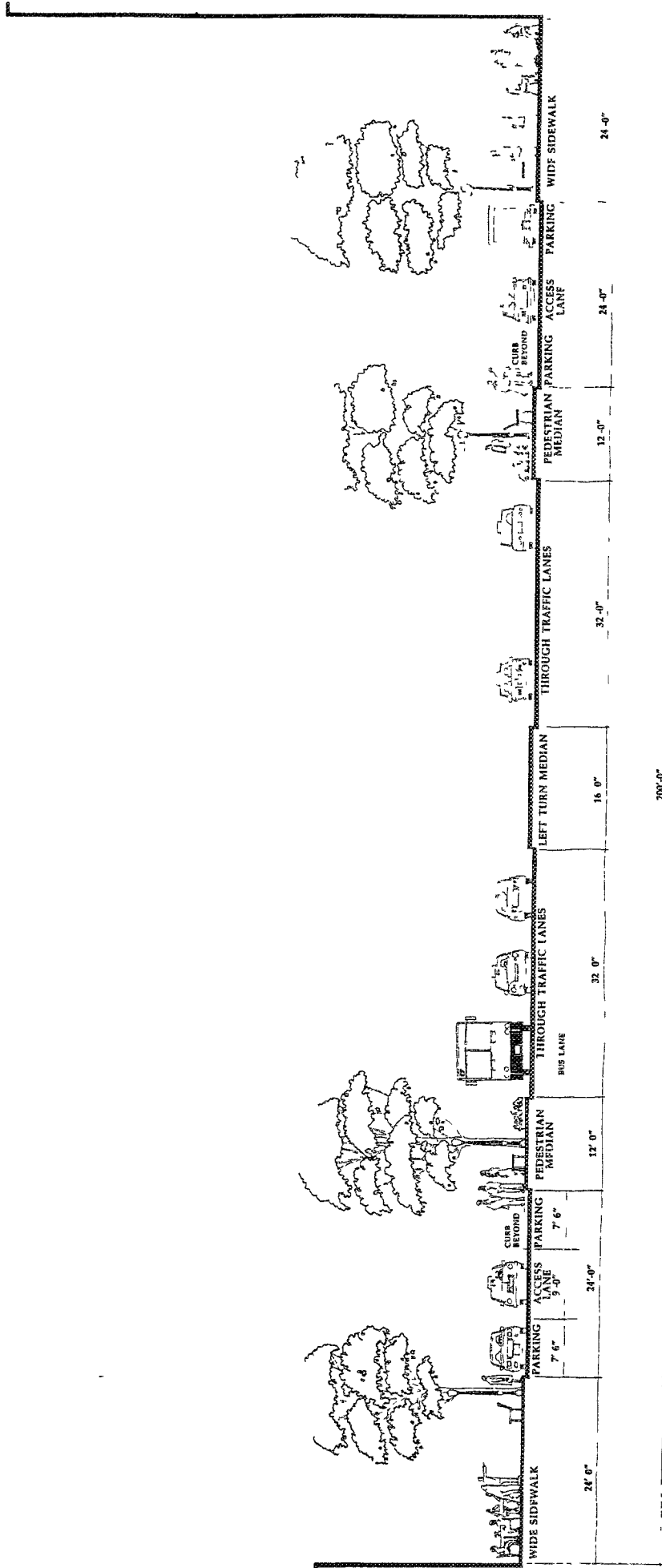


Figure 2.11. Queens Boulevard Plan: Redesign Alternate A  
 Approximate Scale: 1" = 100'





**Figure 2.12. Queens Boulevard Section: Redesign Alternate B**

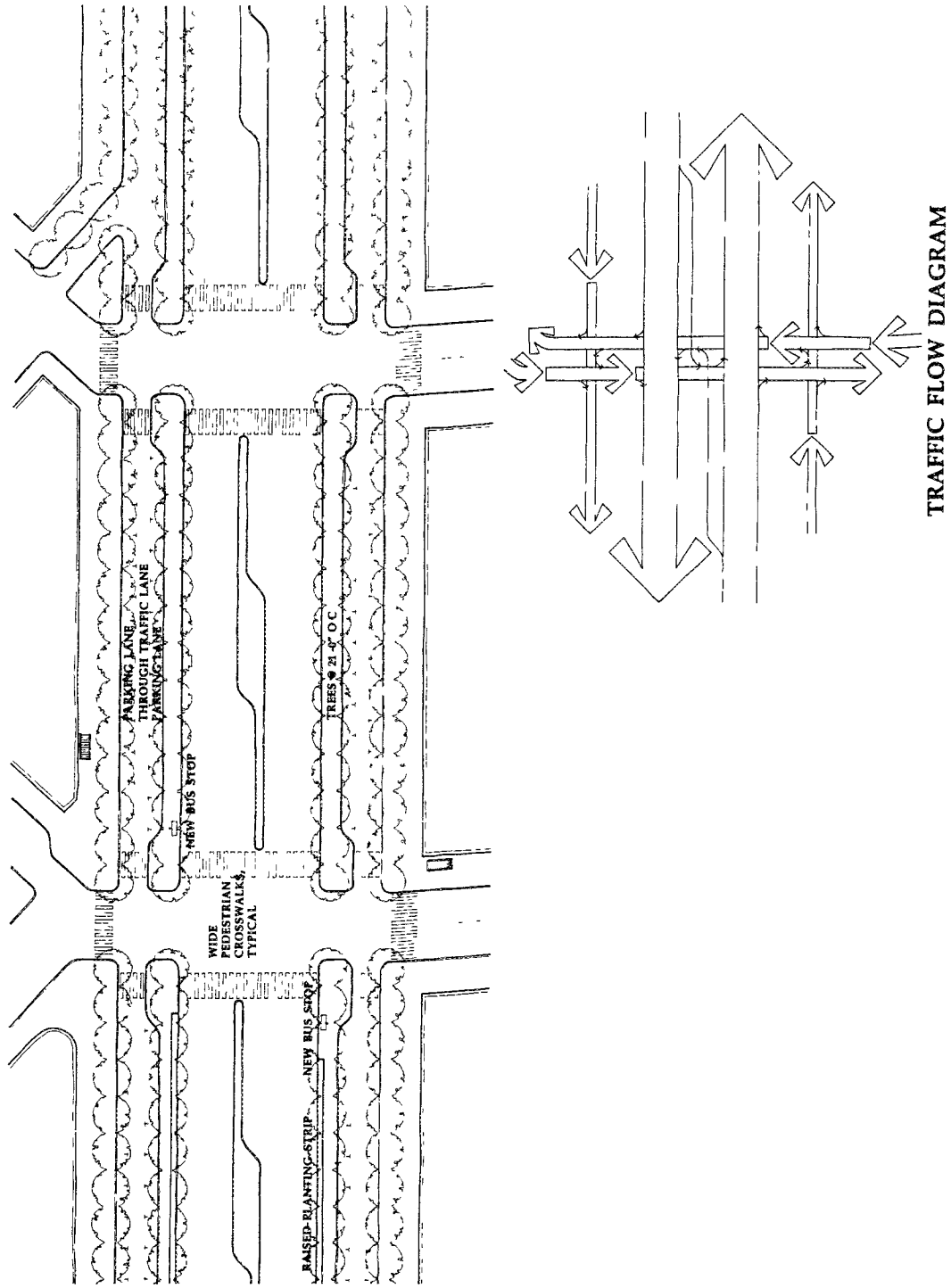


Figure 2.13. Queens Boulevard Plan: Redesign Alternate B  
 Approximate Scale: 1" = 100'

The purpose of this design was to test whether a wide-sidewalk/narrow-median boulevard configuration makes sense for a street with a high level of shopping activity, and whether such a configuration would be received more or less favorably than a narrow-sidewalk/wide-median design. (A conclusion, based on feel and reflected in the guidelines which follow, was that in order to reinforce the whole pedestrian realm it makes more sense to have wide medians and narrow sidewalks )

## Summary of the Responses

Participants at the presentation included the Commissioner of Planning, the Assistant Commissioner of Planning, the Assistant Commissioner of the Transportation Intelligence Division, the Director of Pedestrian Projects, three Safety Engineers, a Transportation Planner, a Planner, and a resident of the Borough of Queens who is a member of the local community planning board

In general, responses were open-minded and positive, even somewhat enthusiastic (most notably from the highest-level officials in attendance), although cautious and skeptical about details. Throughout, most of the discussion centered on Queens Boulevard, primarily because it is the subject of a safety study currently under way in the planning department. Of particular note is that the pedestrian-realm concept, as an idea, was received positively and participants used the term often during the discussion.

The main concerns expressed were skepticism about capacity and safety. A point of discussion was whether existing capacity could be maintained on the street given the elimination of a traffic lane on the access roads. Safety concerns included the general observation that the reason why the Grand Concourse and Queens Boulevard are unsafe and Ocean Parkway and Eastern Parkway are safe is because of land-use rather than configuration. The argument was that commercial land uses make a boulevard unsafe because of the increased pedestrian traffic and the higher number of street-crossings. There was also skepticism about the whether the proposals to discourage jay-walking — continuous benches or high planting in the medians — would actually be effective.

The proposed median trees were a major point of discussion. Some participants expressed skepticism about obtaining funding for tree-planting and maintenance. Others countered with the observation that the public values trees and therefore money or volunteer work could be expected. The role of trees in defining the pedestrian realm and the value of bringing them right up to the intersections were discussed positively.

No preference was expressed for one design proposal over the other for either of the streets.

It was requested that a presentation of the Grand Concourse designs be made at the office of the Bronx Borough President, to staff, and to a Bronx citizen group studying the street and considering possible improvements. The presentations and discussion took place in the afternoon. Subsequently, a request was received for a copy of the video/film to be shown to community groups.

Case Study #2  
Renovation of a Major Urban Arterial  
Geary Boulevard, San Francisco

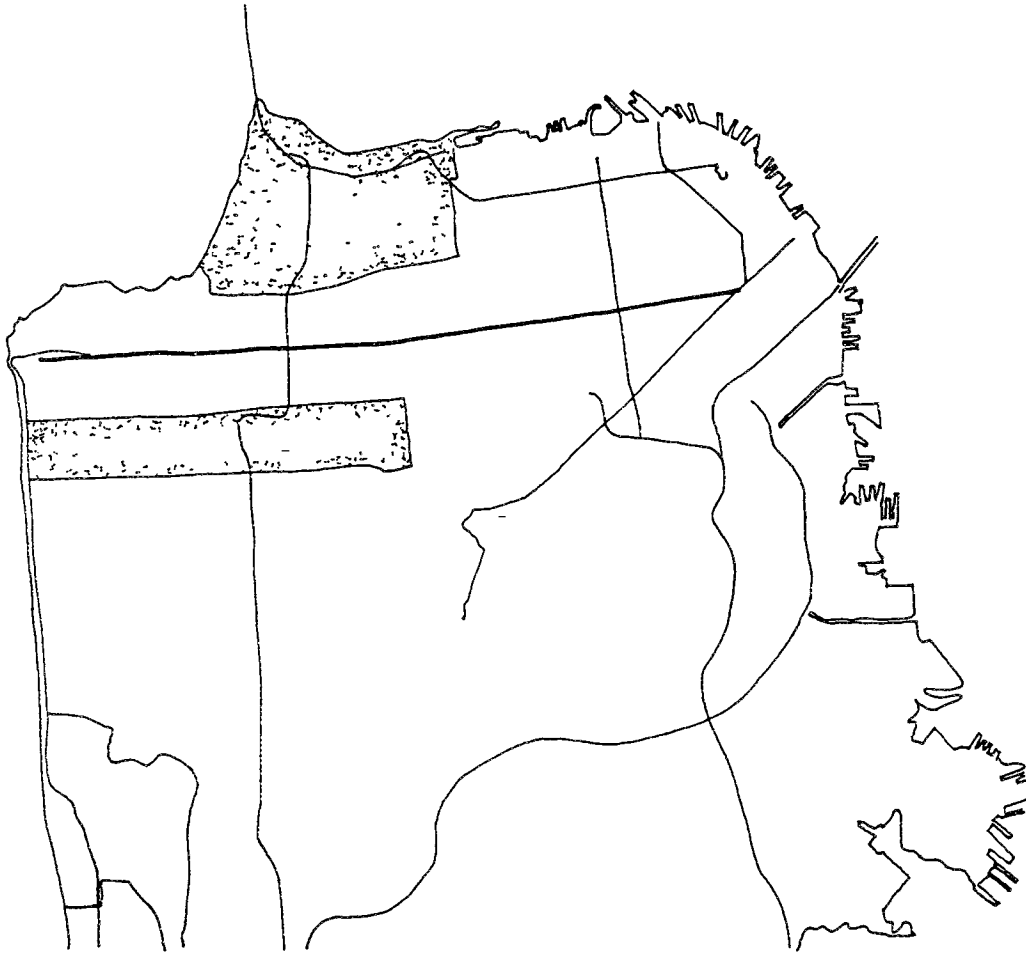


Figure 2.14. Urban Context Map of San Francisco  
Approximate Scale: 1:100,000

## Urban Context

Geary Boulevard is a major arterial street in San Francisco. It is the main east-west route through the northern part of the city and carries a high volume of traffic (45,000 ADT),<sup>6</sup> especially during morning and evening commute hours. A city-sponsored planning study is investigating transit options for Geary, including the feasibility of putting a light-rail line on the street which would tie in with the municipal MUNI system and the regional BART rapid transit system.

Geary Boulevard is almost six miles long and runs from Market Street in the downtown to Sutro Heights Park at the western edge of the city (figure 2.14). Its length is divided into four distinct sections, each with different land uses and varying cross-sections. The downtown section from Market to Gough is narrow and densely built with offices, hotels, apartments, shops, and theaters. From Gough to Masonic, where it runs through an area redeveloped in the 1960s as part of urban renewal, it widens into an expressway lined primarily with large-footprint institutional buildings and commercial developments. After the tunnel at Masonic, it narrows back to its original width and runs through largely residential neighborhoods, developed for the most part since the 1920s. From Masonic to roughly 25th Avenue, Geary is lined primarily with two- to four-story buildings having ground-floor commercial uses mostly in the form of small shops. After 25th Avenue Geary is predominantly lined with one- and two-story single-family houses and duplexes and some larger apartment buildings at corners.

The boulevard design proposals developed for Geary are for the mixed-use section of the street between Masonic and 25th Avenue; however, similar configurations would work for the residential section and, with modifications, for the redevelopment section.

### *Existing Configuration (Figures 2.15 and 2.16)*

For the section under consideration, Geary Boulevard has a right-of-way of 125 feet. The existing roadway is 99 feet wide and accommodates two lanes of traffic in each direction, a left-turn lane, and diagonal parking on both sides. Sidewalks are approximately 13 feet wide and planted randomly with small and widely spaced trees. Buildings along the street are generally built to the property line and most are two to four stories high, although some buildings (most often at corners) are taller.

### *Opportunities*

Geary Boulevard is a prime candidate to have a boulevard configuration. It is a major traffic route through the city but it also is densely built with shops and residences that require access. Geary as it exists today is generally a lively, active street. People throughout the city come to the shops, restaurants, and movie theaters along it, and both locals and tourists use it as a route to the historic Cliff House/Sutro Baths area and the Golden Gate National Recreation Area along the Pacific coast. Re-configuring Geary as a boulevard would emphasize it as a significant street in the city, making it more memorable and thereby helping to clarify the city structure. It would also help better meet the needs of all the various

people who use Geary in different ways — the people who live on the street, those who travel on it using different modes of transportation, and those who come to it to shop or to work

In its current configuration, Geary is designed primarily to facilitate fast-moving through traffic. Access to abutting properties is provided by the plentiful diagonal parking spaces, but this creates conflicts because people looking for parking or pulling in and out of spaces interfere with through traffic. Because of the numerous shops along the street, delivery vehicles often double-park, creating further conflict. A boulevard configuration would provide separate distinct realms for through traffic and for access. It would create enhanced pedestrian realms adjacent to the shops, making Geary a more pleasant and pedestrian-friendly commercial street. The pedestrian realm would be enhanced by the inclusion of light-rail transit with stops along the medians.

### *Boulevard Redesigns*

Two boulevard design alternatives were developed. Both have dedicated lanes for the light-rail trams, and both have 40-foot-wide center roadways with two traffic lanes in each direction and no dedicated left-turn lanes. (With the narrow roadway, it was impossible to have both dedicated transit lanes and a dedicated left-turn lane. It was decided that dedicated transit lanes were more important. To keep commute traffic moving, left turns would be restricted at most intersections during rush hours.) In both, the combined pedestrian realm is 68 percent of the total right-of-way. The main difference between the schemes lies in where the light-rail tracks are located: although the tracks are incorporated into raised medians in both designs, in one they run on the inside of the line of trees and in the other they run on the outside, a subtle difference but one with a big impact on how the street would feel and function. Included in both designs is a limited reconfiguration of cross-streets to include diagonal parking for a distance of about 120 feet from the corner (the typical frontage lot width), in order to replace parking spaces lost on Geary by eliminating its diagonal parking.

### *Alternate A (Figures 2.17 and 2.18)*

The idea of this design was to test incorporating light-rail vehicles within the pedestrian realm. The raised medians have light-rail tracks along their inner edges and are generally 15 feet wide except where they widen at some intersections to accommodate transit stops. The medians are paved and lined with trees closely spaced at 15-foot centers. The access lanes are 17.5 feet wide, allowing one traffic lane and one parking lane. They are narrowed at intersections by sidewalk bulbs that facilitate pedestrian crossing. Existing sidewalks are narrowed to be 10 feet wide.

An advantage of this design is that the pedestrian realms on each side feel wider because the tree line is located at the outer edge of the medians. The trade-off is that the light-rail vehicles intrude into the pedestrian realm, which may present a hazard. (The question is whether the trams function as local-access vehicles or through-traffic vehicles, with the probable answer being that they function as both.)

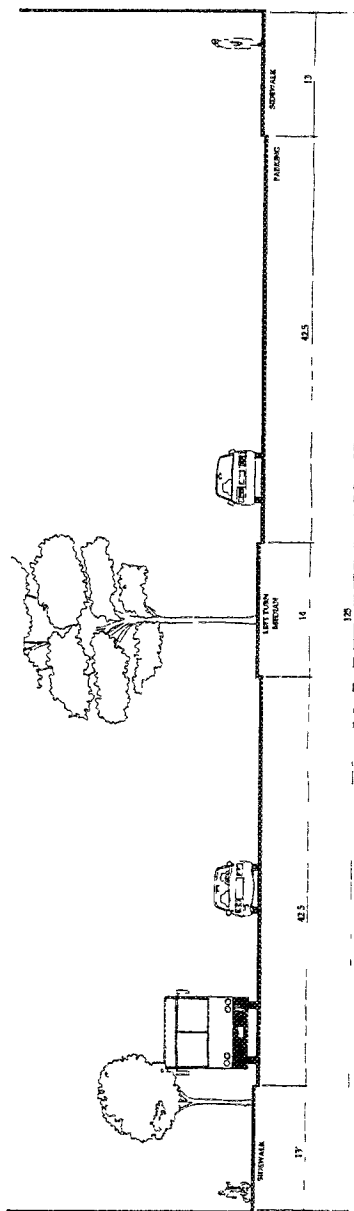


Figure 2.15. Geary Boulevard Section: Existing Configuration

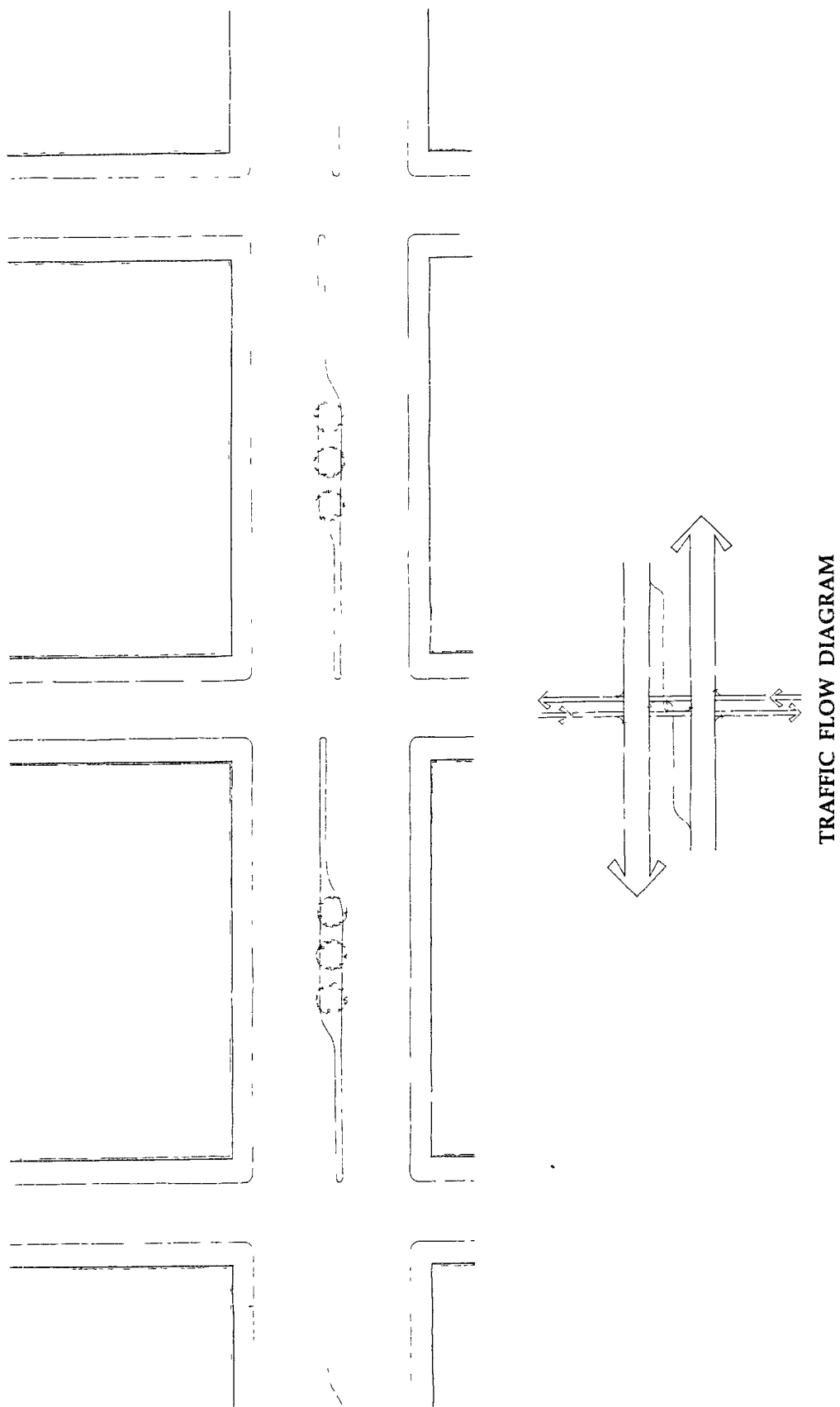


Figure 2.16. Geary Boulevard Plan: Existing Configuration  
 Approximate Scale: 1" = 100'



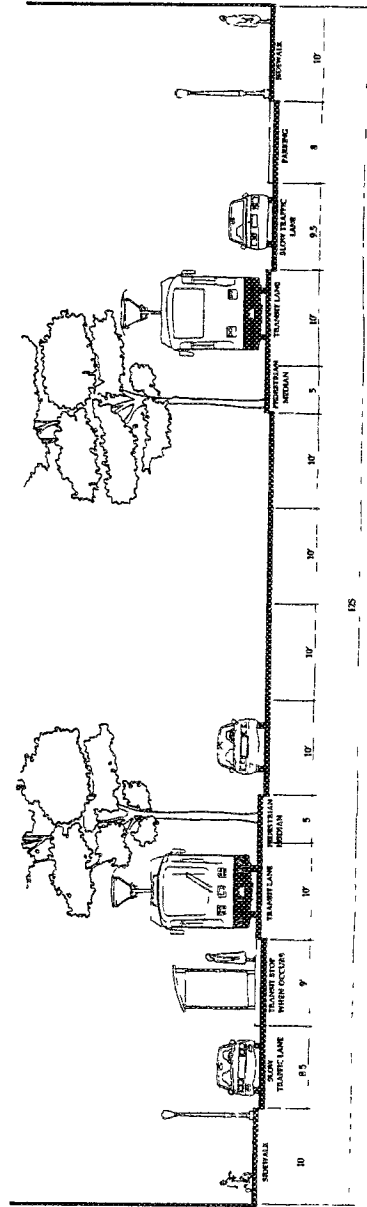
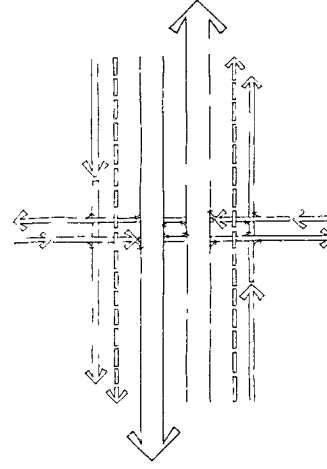
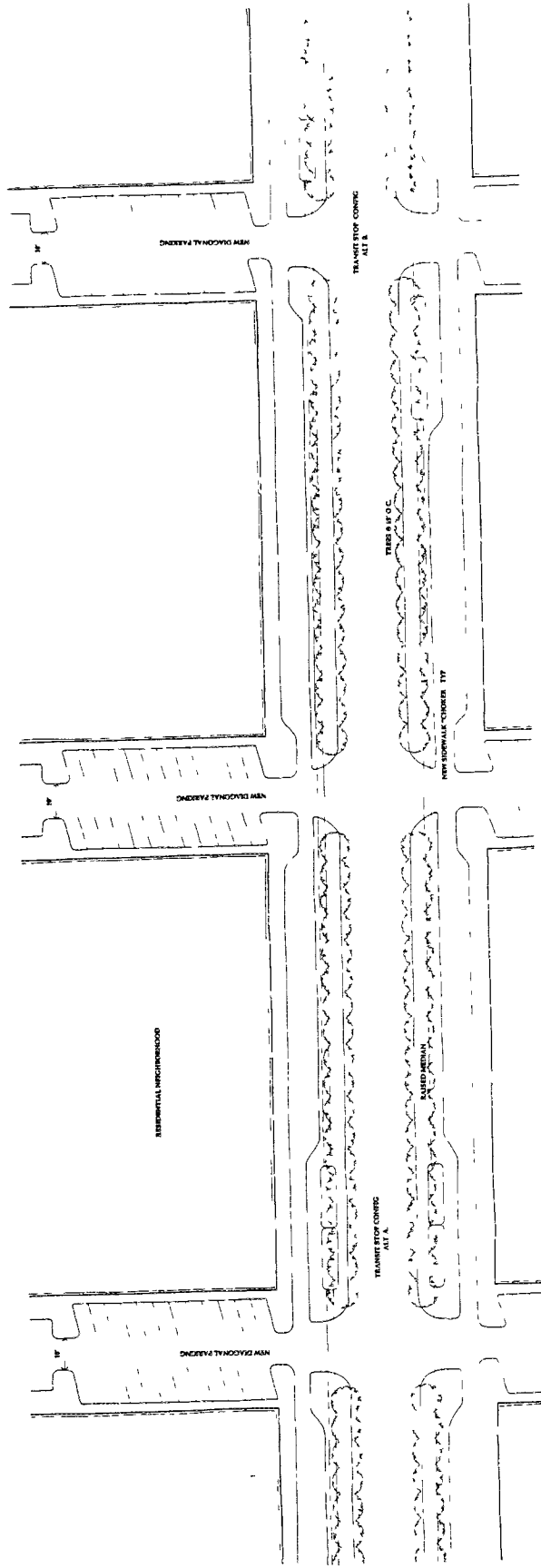


Figure 2.17. Geary Boulevard Section: Redesign Alternate A



TRAFFIC FLOW DIAGRAM

Figure 2.18. Geary Boulevard Plan: Redesign Alternate A  
 Approximate Scale: 1" = 100'

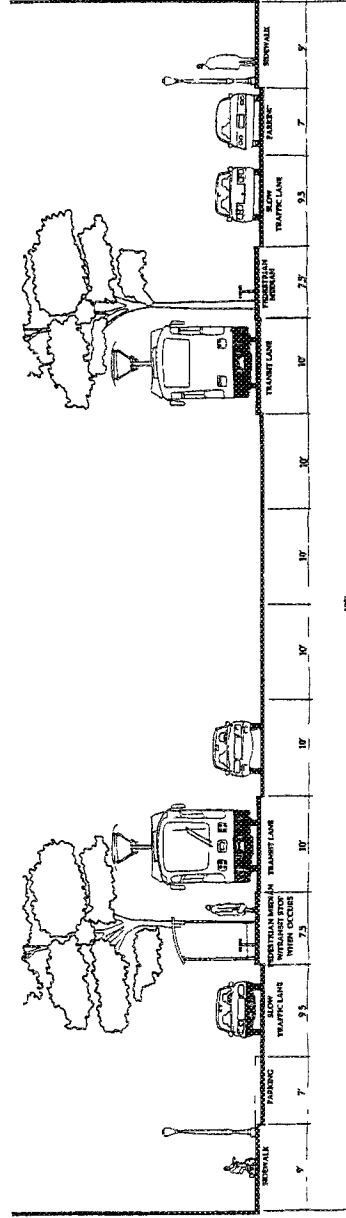
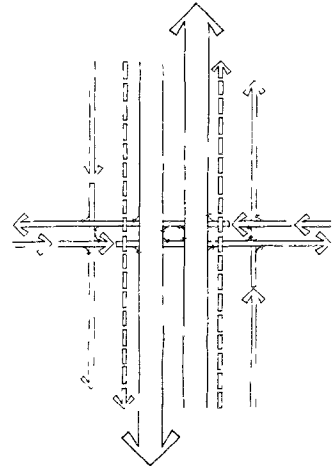
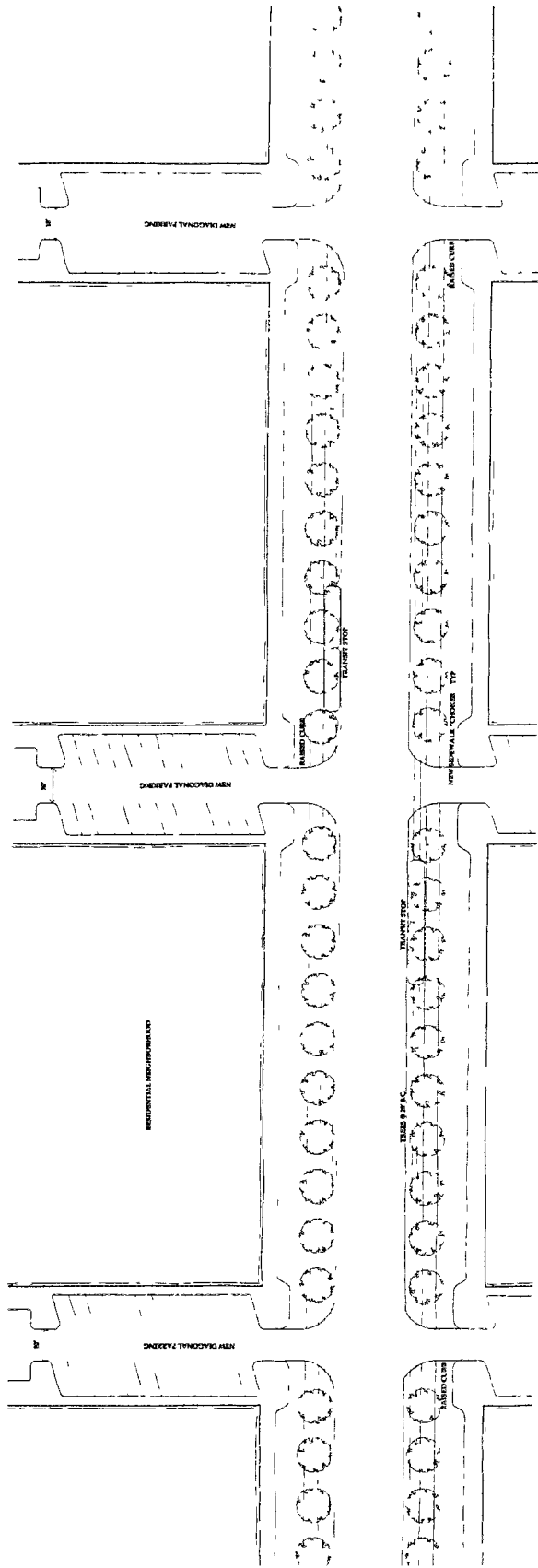


Figure 2.19. Geary Boulevard Section: Redesign Alternate B



**TRAFFIC FLOW DIAGRAM**

**Figure 2.20. Geary Boulevard Plan: Redesign Alternate B**  
 Approximate Scale: 1" = 100'

Whether or not it makes sense to include trams within pedestrian realms may depend on the transit operating speed and frequency of stops.) A real disadvantage of the design, given the commercial nature of much of the street, is the reduced amount of parking due to the median bulbs that are necessary in order to provide loading platforms on the pedestrian-realm side of the trams

#### *Alternate B (Figures 2.19 and 2.20)*

This design has slightly wider medians than Alternate A (17.5 feet), with light-rail tracks running along the outer edges instead of the inner edges. Trees on the median have a somewhat wider spacing (28 feet o c.), with the intent that they would be larger species. As in Alternate A, the access lanes allow one traffic lane and one parking lane, but they are slightly narrower (16.5 feet) and in addition have one-inch raised curbs at intersections which are intended to slow traffic. Sidewalk chokers narrow the access roads at intersections. Sidewalks are narrowed to nine feet wide.

An advantage of this design is that the light-rail trams run at the outer edge of the pedestrian realm rather than within it. In this location, they serve as an interface between pedestrians in the pedestrian realms and the fast-moving center. A further advantage is that no median bulbs are required because the loading platforms can be easily incorporated in the standard median width. A disadvantage of the design is the reduced apparent width of the pedestrian realm because the tree line is located toward the inner edge of the medians. Narrower sidewalks and narrower access roads may be perceived as a disadvantage, but that is not necessarily so.

### **Summary of the Responses**

Participants at the presentation meeting included the Manager of General Engineering Services for the Department of Public Works, the Bureau Chief of the Traffic Engineering Department, the Director of Service Planning for the San Francisco Municipal Railway (MUNI), a Transit Planner for MUNI, a Transportation Manager from the Offices of the Chief Administrative Officer, and a transportation planner affiliated with the Metropolitan Transportation Commission (MTC).

In general, responses were positive and open-minded, although most participants expressed skepticism about some aspects of the designs. It should be noted, however, that often after a concern was raised the participants spent considerable time coming up with solutions to solve the perceived problem.

The main responses had to do with concerns about safety, capacity, and the problems associated with deviating from accepted standards. The main safety concern was the perceived extra conflicts between cars and trams due to locating the tram lines along the medians rather than in the center of the roadway. (One participant observed, however, that this concern was not greater on boulevards than on normally configured streets.) Concerns were also expressed about the adequacy of the proposed narrow lanes for fast traffic movement, in the center, and for emergency vehicle use, on the access roads.

There was much discussion about the effect of eliminating the dedicated left-turn lane from the center roadway, with the consensus being that this would lessen capacity (because of congestion if left-turns allowed from non-dedicated lanes), and safety (because of driver frustration at either the congestion or the inability to turn).

In terms of deviating from accepted standards, skepticism was expressed that "higher-ups" or other agencies would approve such deviation. Of main concern was that federal and state funding might be jeopardized. Some participants also expressed concern that underground utilities might not be adequately accommodated in the less-than-standard-width sidewalks proposed, accepted practice being that street utilities should be located where traffic will not be disrupted when utilities are being accessed.

The consensus among participants was a preference for Alternative Design B, primarily because there was perceived to be less conflict between trams and pedestrians and between trams and cars, and more visibility for transit vehicles.

Case Study #3  
Redesign of a Major Urban Ceremonial Street  
Capitol Mall, Sacramento

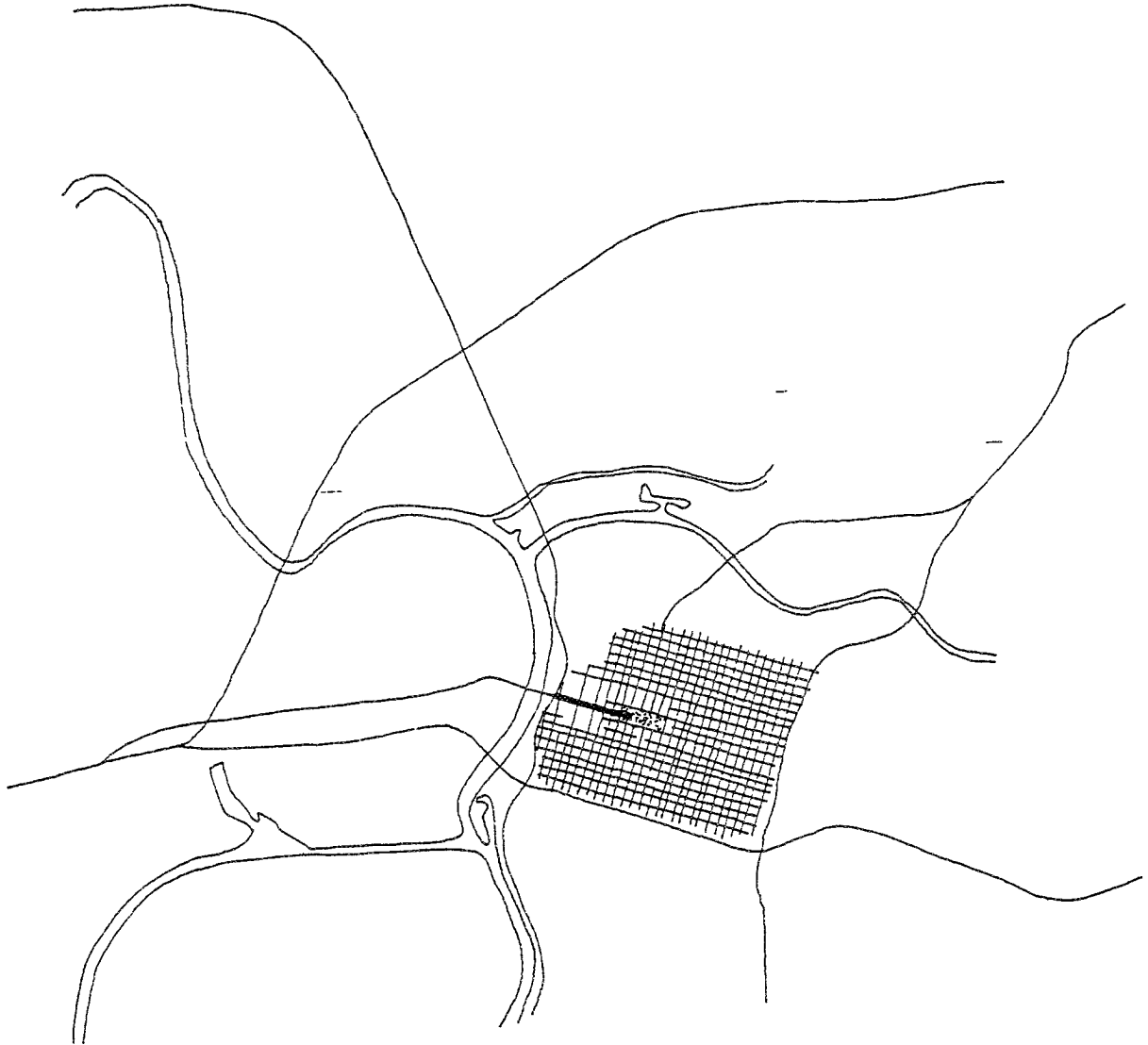


Figure 2.21. Urban Context Map of Sacramento  
Approximate Scale: 1:100,000

## Urban Context

Capitol Mall is a special ceremonial street in the state capitol of Sacramento. It is seven blocks long, running through the downtown between the Sacramento River and Capitol Park, where the state capitol building is located. It is on axis with the capitol dome, which provides an impressive terminus to the street. It is lined primarily with state and federal office buildings, as well as some private office buildings, ranging from four-floor height to high-rise. It carries only a moderate amount of traffic (5,370 ADT),<sup>7</sup> but is a high-profile street since it is used by both local and out-of-town people involved in state affairs and serves as a destination for tourists visiting the capitol.

### *Existing Configuration (Figures 2.22 and 2.23)*

Capitol Mall has a 176-foot-wide right-of-way which is currently configured with a wide center median (42 feet) flanked by a divided roadway with two to three lanes of traffic in each direction. The center median is planted with lawn and is more ornamental than useful, as people do not walk along it or congregate there. Sidewalks along either side are planted with two rows of mature, closely spaced trees providing pleasant places to walk.

### *Opportunities*

As a prominent ceremonial street, Capitol Mall is an exceptionally good candidate for a boulevard configuration. Turning it into a boulevard would emphasize it as a special street and make it particularly memorable. However, because of the axial nature of the street and its alignment on the Capitol dome, there is a compelling argument for retaining the center-median configuration and creating a pedestrian promenade. For either configuration, the number and width of through traffic lines could be minimized, given the low traffic volume and the ceremonial aspect of the street, which invites slow rather than fast driving.

### *Boulevard Redesigns*

Two very different designs were developed for Capitol Mall, one with a classic boulevard configuration and the other with a center promenade configuration. Both leave the existing sidewalk alleés intact. The advantage of the classic boulevard configuration is that the access lanes would work well for the hotel land uses that are being encouraged for a few vacant sites. The center promenade design has the advantage of emphasizing the axial nature of the street and view of the dome by allowing pedestrians to walk down the middle of the street.

### *Alternate A (Figures 2.24 and 2.25)*

This design proposes a classic boulevard configuration. In it, the 50-foot-wide center roadway is configured with two lanes of traffic in each direction and a left-turn lane (10-foot lane widths). The com-



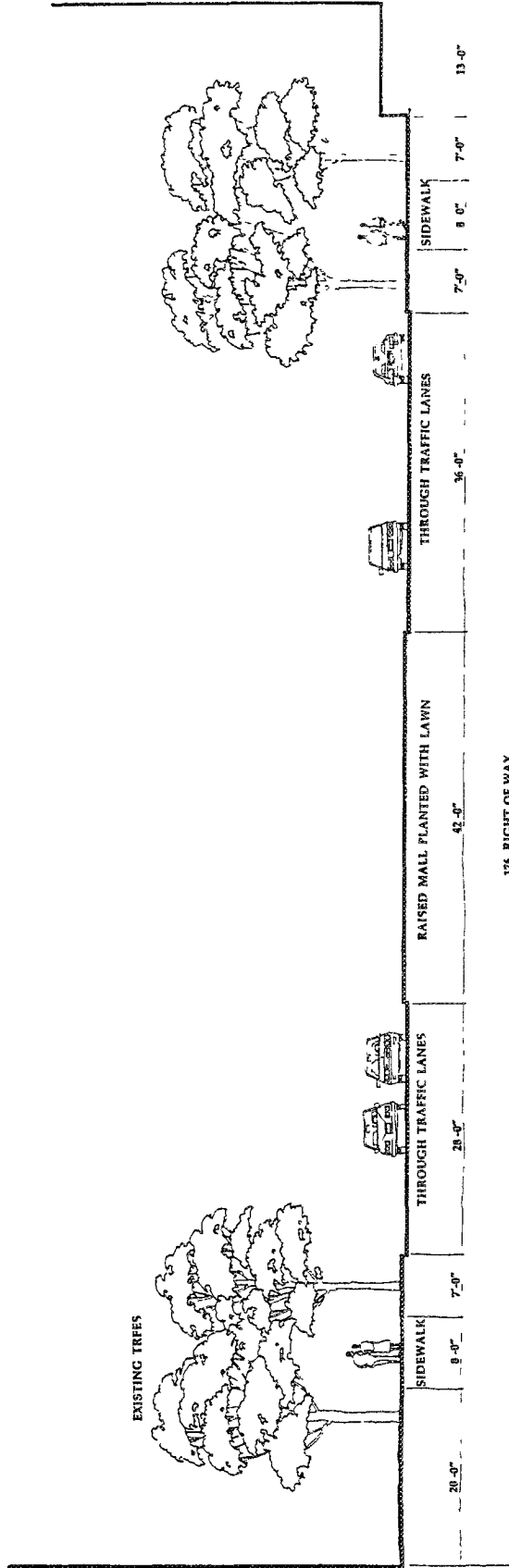


Figure 2.22. Capitol Mall Section: Existing Configuration

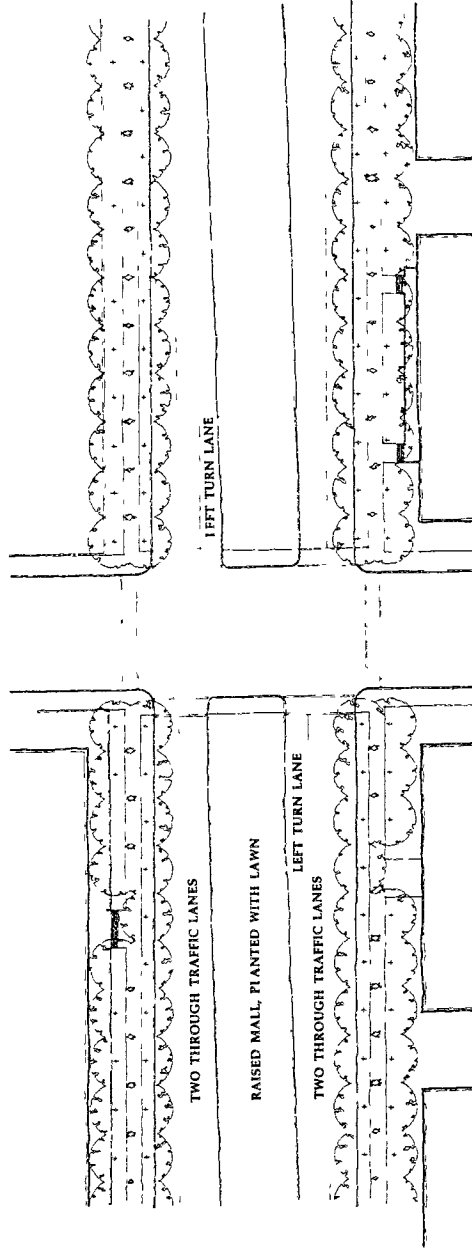


Figure 2.23. Capitol Mall Plan: Existing Configuration  
 Approximate Scale: 1" = 100'

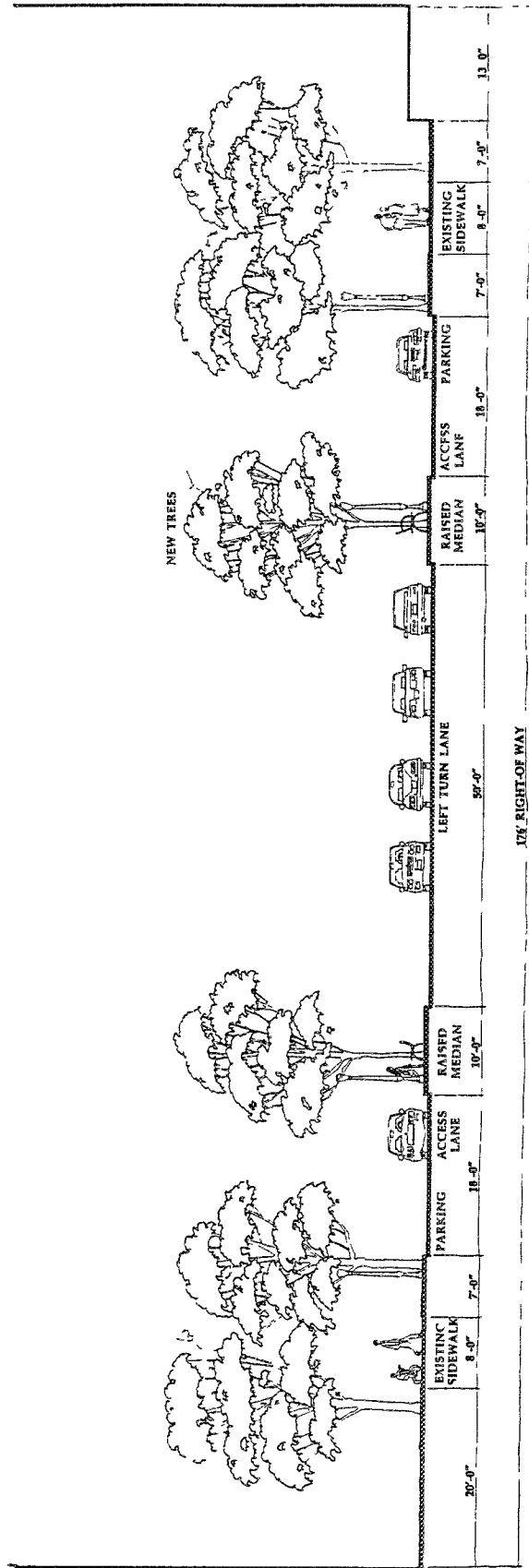


Figure 2.24. Capitol Mall Section: Redesign Alternate A

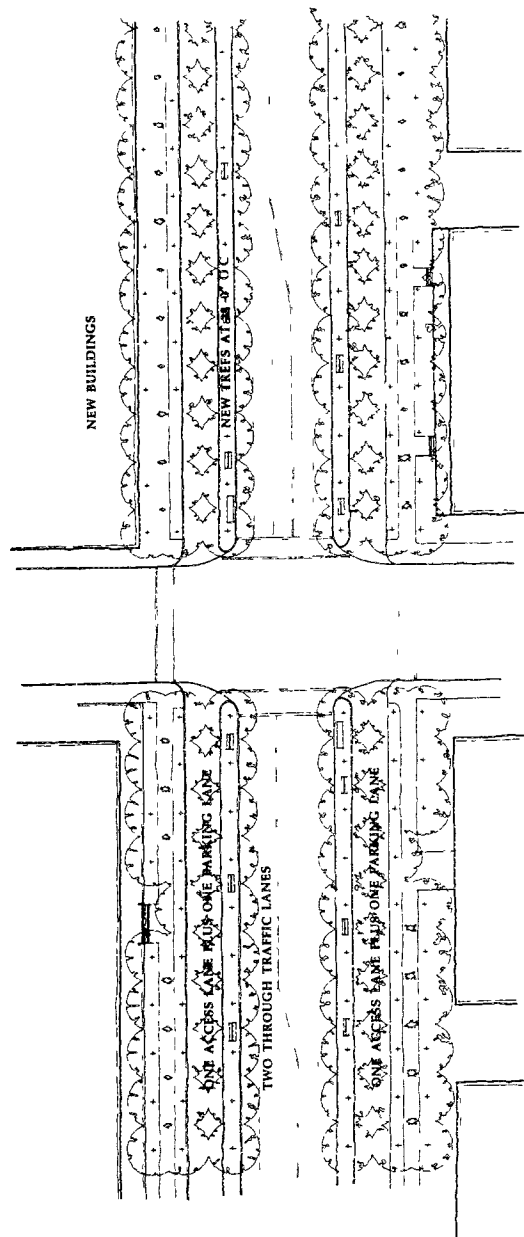


Figure 2.25. Capitol Mall Plan: Redesign Alternate A  
 Approximate Scale: 1" = 100'

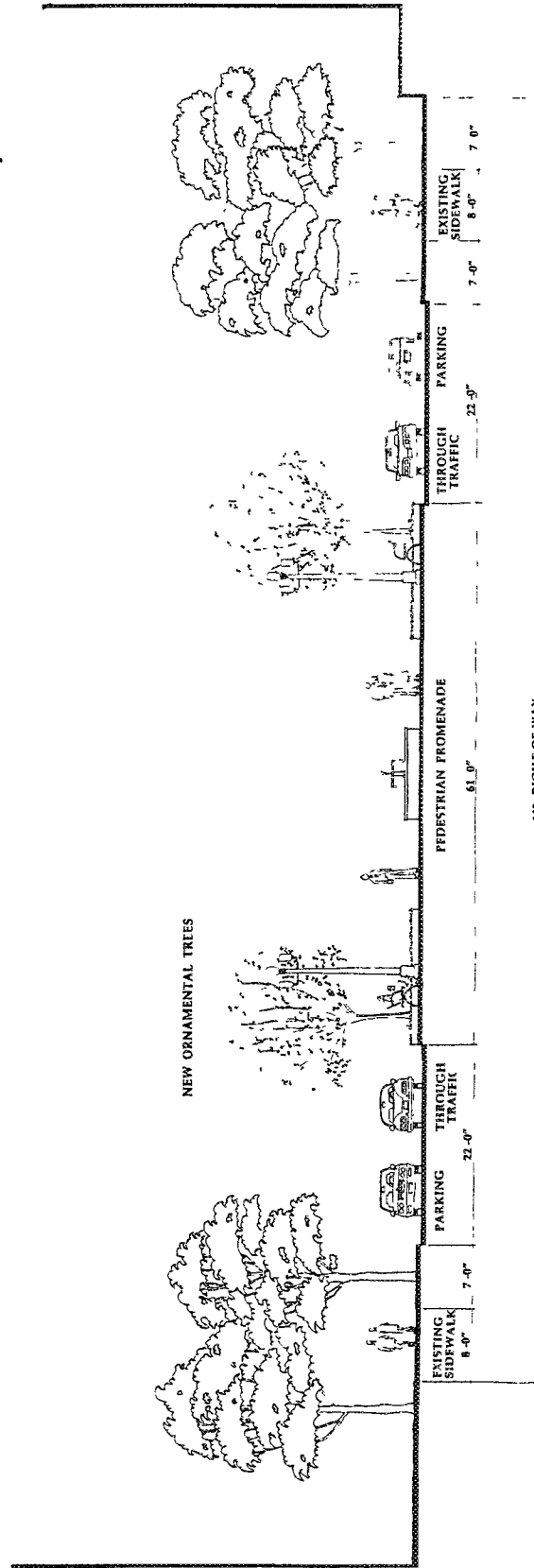


Figure 2.26. Capitol Mall Section: Redesign Alternate B

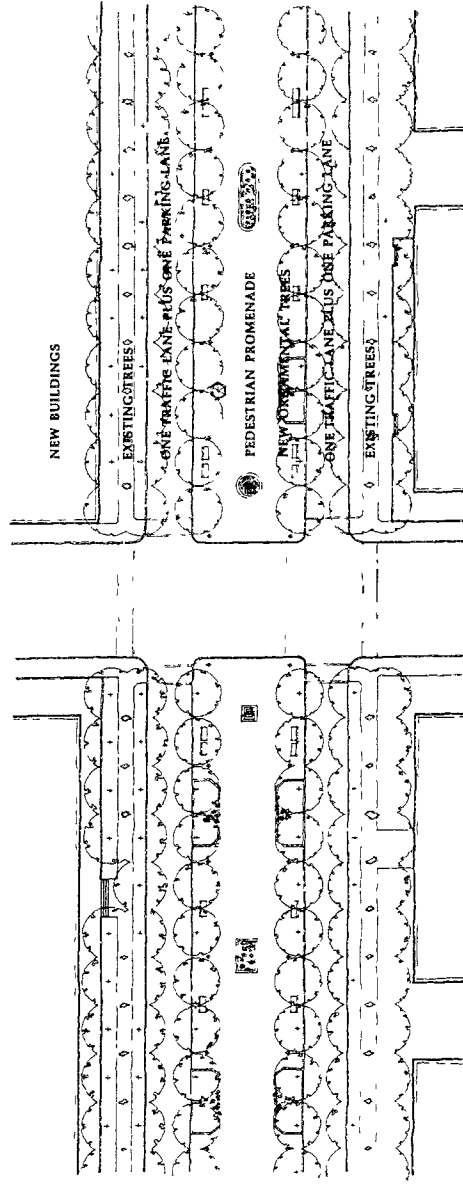


Figure 2.27. Capitol Mall Plan: Redesign Alternate B  
 Approximate Scale: 1" = 100'

bined pedestrian realm is 71 percent of the total right-of-way. The raised medians along each side are 10 feet wide and lined with a single row of trees, spaced at approximately 25 feet on-center to match the existing sidewalk tree spacing. The medians are paved to encourage walking along them and are provided with pedestrian amenities such as closely spaced trees and pedestrian-scale light fixtures. The access lanes are 18 feet wide, allowing one traffic lane and one parallel parking lane.

#### *Alternate B (Figures 2.26 and 2.27)*

In this design, the existing center median configuration is enhanced by widening the median to 61 feet and turning it into a tree-lined pedestrian promenade. Special pedestrian amenities are provided including paving, benches, pedestrian-scale light fixtures, planters for ornamental plants, and a few small fountains. The roadways along either side of the median are narrowed to 22 feet, allowing one wide traffic lane in each direction and one parking lane. One traffic lane was felt to be adequate because of the low traffic volume, the short street length, and the desirability of enabling pedestrians to cross to the promenade at will.

#### **Summary of Responses**

The presentation meeting was attended by three participants: the Deputy Director of Public Works, a Supervising Engineer in Transportation Planning, and a Traffic Engineer.

Responses were both positive and highly skeptical, and in general there was not much detailed discussion. The Deputy Director of Public Works was the most enthusiastic about the proposals, saying that both designs would be good applications for Capitol Mall. The traffic engineers preferred Alternate B, describing Alternate A as "much less safe." One argued for a second traffic lane in each direction, citing the needs of emergency vehicles. Liability was raised as a major concern.

Of note is that, toward the end of the meeting, the Deputy Director of Public Works suggested that streets like Alternate A, the classic boulevard design, might be appropriate for use in newly developing areas with high traffic volumes.

Case Study #4  
Revitalization of a Small City Commercial Strip  
West Capitol Avenue, West Sacramento

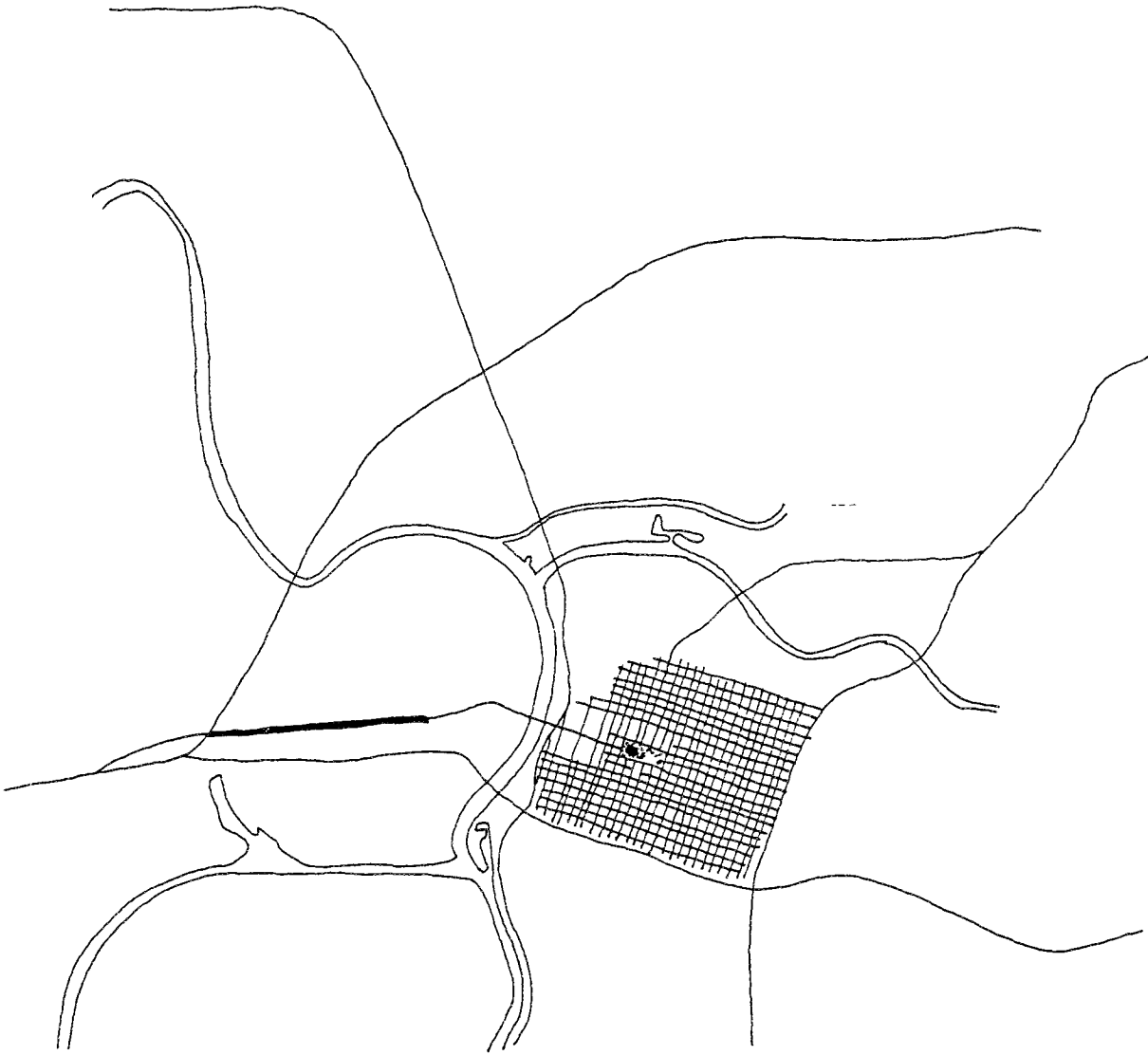


Figure 2.28. Urban Context Map of West Sacramento  
Approximate Scale: 1:100,000



## Urban Context

West Capitol Avenue is the main commercial street in the small suburban city of West Sacramento, a city across the river from Sacramento. The city is characterized by low-density single-family neighborhoods and strip commercial streets. West Capitol Avenue is about 3-1/2 miles long and runs east-west through the northern part of the city, eventually crossing the Sacramento River where it enters Sacramento and turns into Capitol Mall.

Development along the street is of a typical strip nature, consisting of fast-food restaurants, gas stations, and small shopping plazas set back behind parking lots. There are also a number of one- and two-story motels along the street, which seem to be used primarily by truck drivers, and an odd assortment of small businesses — auto shops and the like — left over from an earlier time. Some motels have been converted to housing units for modest income people. Economically, the street seems to be moderately in decline.

Traffic along the street is not heavy (18,114 ADT),<sup>8</sup> with commute traffic for the most part concentrated on the Interstate 80 Business Loop which runs parallel a few blocks away. It does, however, carry a significant amount of traffic compared to other streets in the city, and is used extensively by local residents as well as truck traffic. There is a long history of the street as a truck corridor. The city has in the past contemplated locating a bicycle path on the street.

### *Existing Configuration (Figures 2.29 and 2.30)*

West Capitol Avenue has a right-of-way of 134 feet. The existing roadway is 102 feet wide, configured with three lanes of traffic in each direction and alternating left-turn lanes located in a wide raised center median. Sidewalks along either side are eight feet wide. Few of the buildings along the street face on to it or are accessed directly off of it. Most buildings are set back behind parking lots, and distances between entrances are long.

### *Opportunities*

Reconfiguring West Capitol Avenue as a boulevard would emphasize it as a main commercial street and might help stimulate both local and citywide revitalization. Mostly, it would create a pedestrian-friendly commercial street in a city that currently has none, which in turn might encourage local people to use it more, both for walking and driving, and ultimately encourage infill development with pedestrian-oriented land uses and building configurations such as small residential and commercial buildings facing the street and accessed directly off of it.

### *Boulevard Redesign (Figures 2.31 and 2.32)*

One boulevard redesign proposal was developed for West Capitol Avenue — a minimum-intervention design which leaves existing curb lines intact. Given the context, and since the existing

pavement width could easily accommodate a boulevard configuration with generous medians and no reduction in through lanes, such a minimal-intervention approach seemed appropriate. There was no compelling reason to develop alternate designs

The boulevard design has a 50-foot-wide central roadway, configured with two lanes of traffic in each direction and a left-turn lane. The combined pedestrian realm is 63 percent of the total right-of-way. Paved medians are 16 feet wide and incorporate bicycle paths along their outer edges. Each median is planted with a line of closely spaced trees (22 feet o c), and provided with benches and light fixture to encourage pedestrians to walk along them. The access roads are 18 feet wide, allowing one traffic lane and one lane of parallel parking.

In order to encourage pedestrian use of the street, this design also proposes gradually reorienting businesses along the street so that they have direct, accessible street frontage. This might be done with infill between existing buildings and by building along the street edge of existing mid-block parking lots.

### Summary of Responses

Participants at the meeting were from the Department of Public Works. They consisted of the Assistant Director of Public Works, the Community Development Director, a Principal Planner, and two Associate Civil Engineers.

Responses were at first skeptical and then guardedly positive. Of note is that toward the end of the meeting, the Assistant Director proposed using a section of the street to do a field test of the guidelines. Throughout the meeting there was much questioning of the research data and an emphasis on obtaining specific answers to detailed questions, such as appropriate intersection spacing.

Initially, the Assistant Director pointed out that from an engineer's point of view there were many "no-no's" in the design, saying that his "dry engineering sense" objected to poor sight lines, the many conflicting movements, and the intersection controls. Specific existing standards — such as Caltrans's sight-line standards — were mentioned, and concerns were expressed about deviating from them, both in terms of potential liability and because the engineers thought they made sense.

Several of the participants were familiar with the Esplanade in Chico, an existing boulevard which has intersection controls similar to those proposed in the design for West Capitol Avenue. They described the Esplanade as a workable street, and indicated a willingness to accept the idea of a similar street in their community.

Concern was expressed that the lines of trees might block retail signage, but there was no discussion of the proposals for reorienting businesses to face directly onto the street.

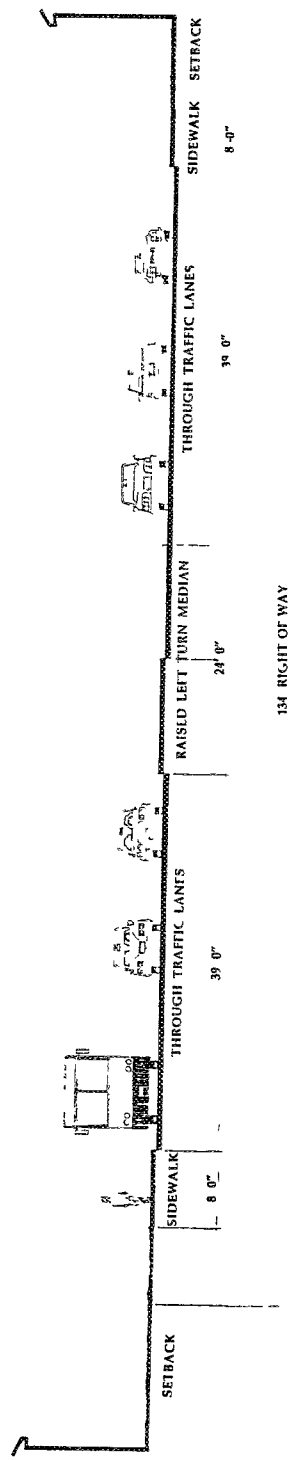


Figure 2.29. West Capitol Avenue Section: Existing Configuration

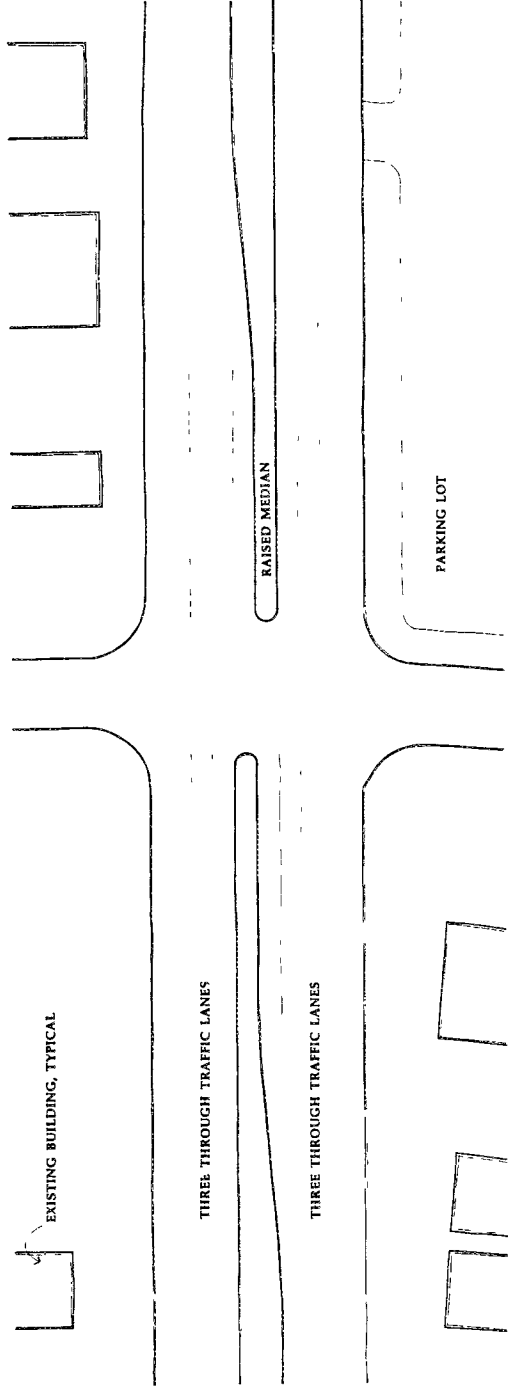


Figure 2.30. West Capitol Avenue Plan: Existing Configuration  
 Approximate Scale: 1" = 100'

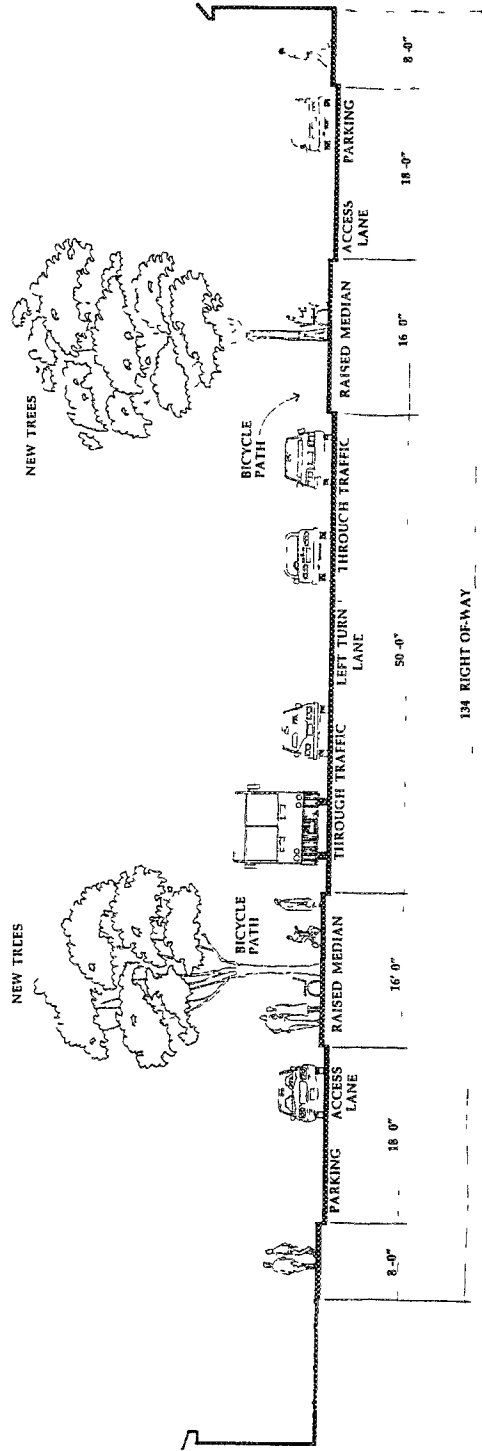


Figure 2.31. West Capitol Avenue Section: Redesign

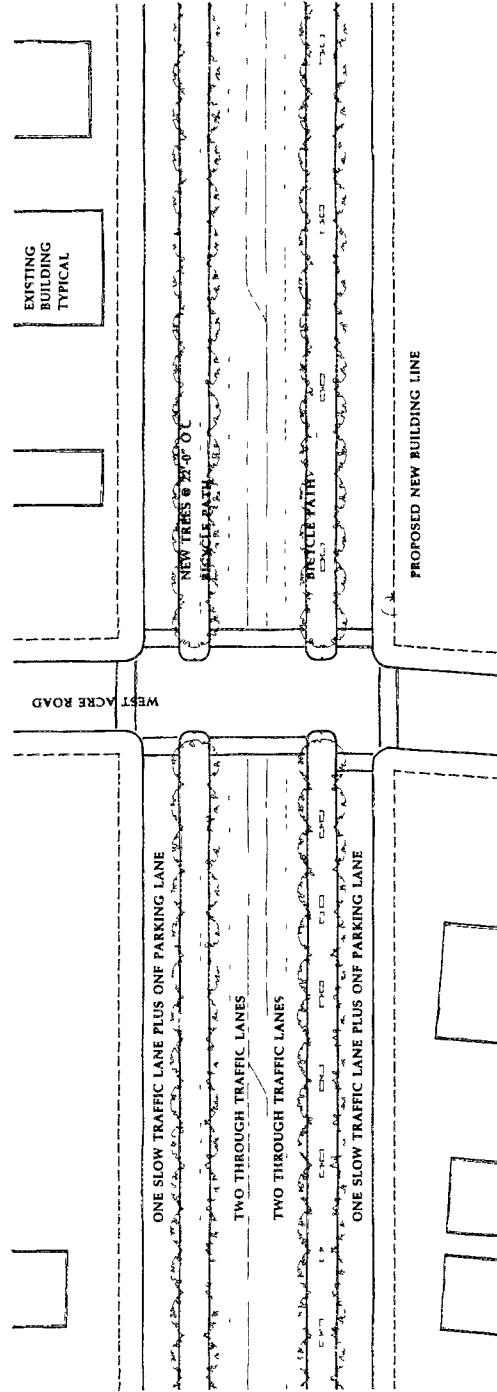


Figure 2.32. West Capitol Avenue Plan: Redesign  
 Approximate Scale: 1" = 100'

Case Study #5  
Improving Suburbia  
Paseo Padre Parkway, Fremont, California  
Mowry Avenue, Fremont, California



Figure 2.28. Urban Context Map of Fremont  
Approximate Scale: 1:100,000

## Urban Context

Fremont is a medium-sized suburban city located in the East Bay, south of Union City, and is made up primarily of low-density middle-class residential neighborhoods. Much of the city was built during the 1950s and 1960s, and street layouts and street designs reflect the influence of design standards based on the concept of functional classification. Recently, development has included higher-density subdivisions that include multi-family apartments and condominiums. There is more commercial and office development than heretofore. The street layout basically consists of a large-scale grid of wide arterial streets overlaid on a smaller grid of curvilinear and discontinuous residential streets. The arterials effectively separate the city into distinct subareas. Some are lined with commercial buildings and some are residential.

Paseo Padre Parkway is a major arterial street that basically makes a loop through the western and northern parts of the city. It runs for about 12 miles, beginning as an exit off of Highway 84 (that leads from the Dumbarton Bridge), then loops past an area of open land, through a residential area, along a flood control channel, past the Civic Center and Fremont Park, finally ending in a residential neighborhood in the eastern hills. For much of its length it is lined with commercial uses — shopping complexes, office and professional buildings, gas stations, and fast food restaurants — most of which do not directly face the street but are set back behind parking lots from which they are accessed. Traffic on Paseo Padre is moderate (30,600 ADT) <sup>9</sup>

Mowry Avenue is a shorter arterial street that runs northeast-southwest through the center of the city in a predominantly residential area. It runs for a little over four miles, between Highway 84 at one end and open bay marshland at the other. Land uses along the street are primarily residential, and for a distance of about one-and-a-half miles, where it runs through a single-family neighborhood, it has a frontage road configuration. Traffic on Mowry is moderately heavy (42,000 ADT), <sup>10</sup> but it moves quickly because the street is wide and used as a through route to the freeway.

### Paseo Padre Parkway

#### *Existing Configuration (Figures 2.34 and 2.35)*

Paseo Padre has a 146-foot right-of-way, configured with a 105-foot roadway providing two lanes of traffic in each direction (14-foot-wide lanes), a left-turn lane, and parallel parking along each side. Sidewalks along each side are six feet wide and lined with planting strips planted with small widely spaced trees. The configuration of the street, and development along it, is typical of suburban commercial arterial streets that were built to functional classification standards.

#### *Opportunities*

Reconfiguring part of Paseo Padre as a boulevard would emphasize it as a special street in the city, which is appropriate given its importance as a commercial street. Reconfiguration could be a first step toward making the street more pedestrian- and transit-friendly, helping to urbanize the city and making the street more walkable. Ideally, implementation of a boulevard configuration would happen in conjunction with re-zoning to allow and encourage densification.



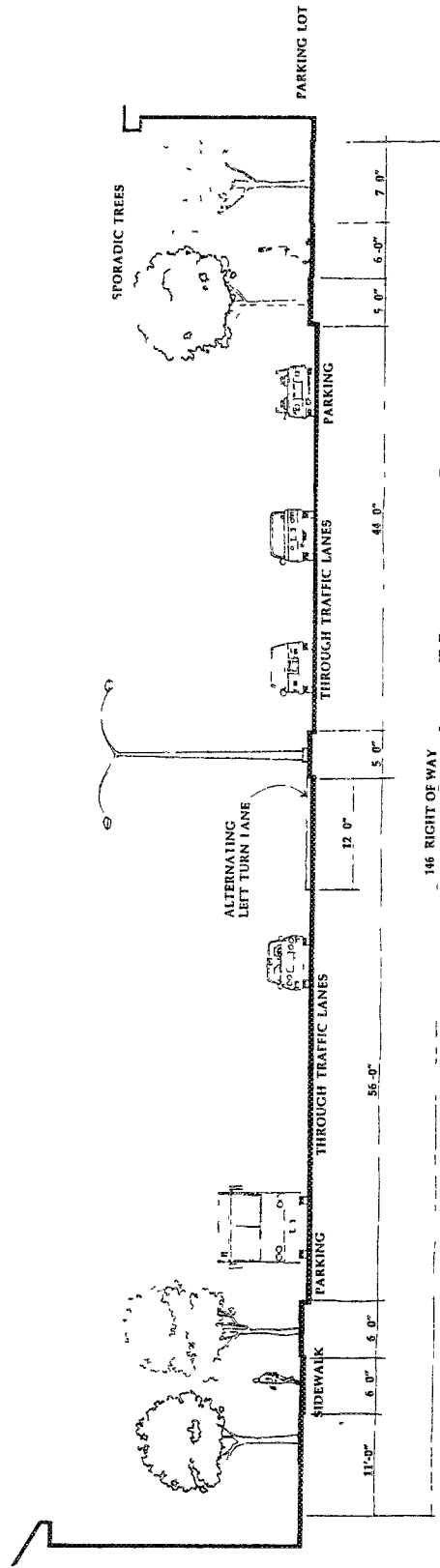


Figure 2.34. Paseo Padre Parkway Section: Existing Configuration

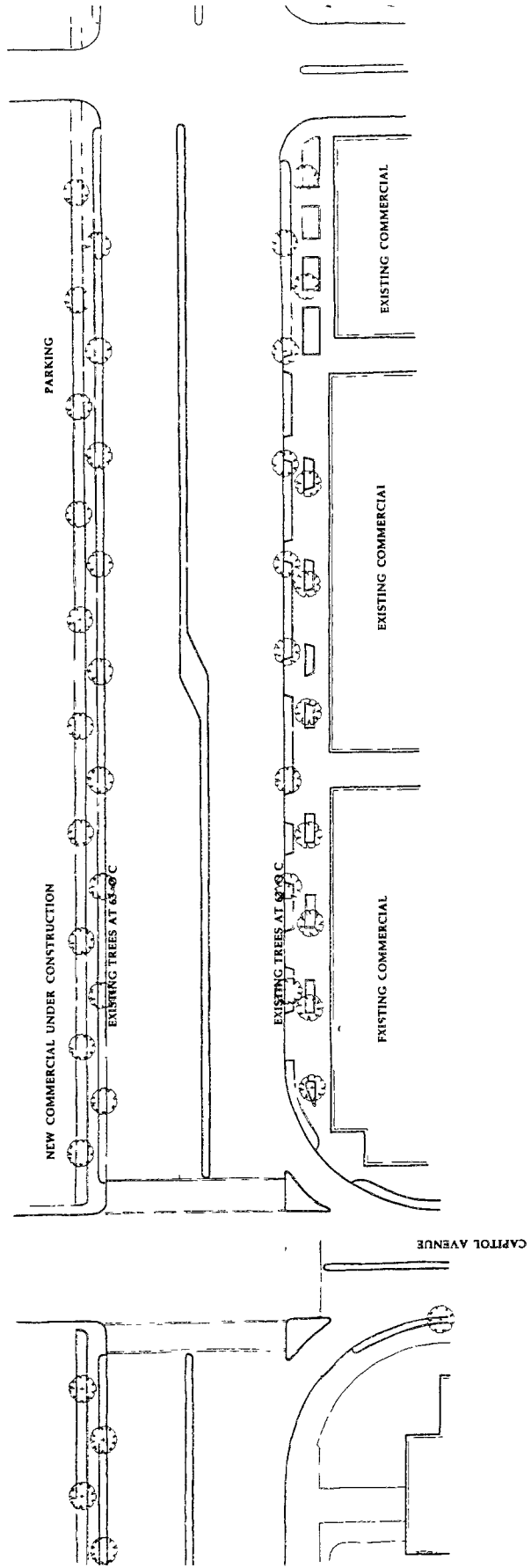


Figure 2.35. Paseo Padre Parkway Plan: Existing Configuration  
 Approximate Scale: 1" = 100'

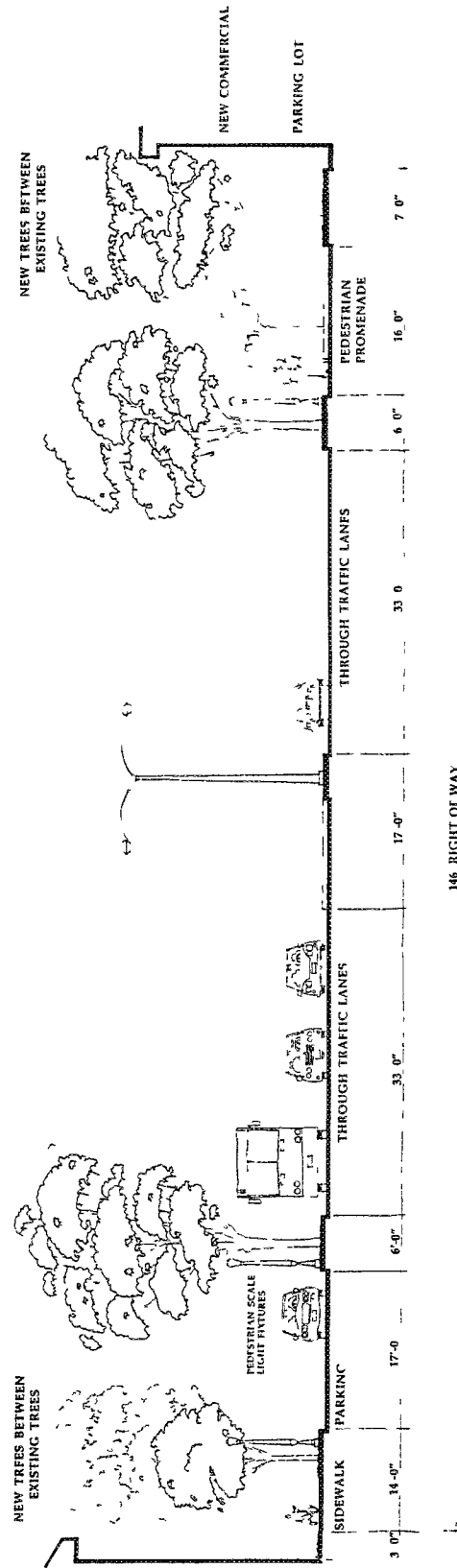


Figure 2.36. Paseo Padre Parkway Section: Redesign

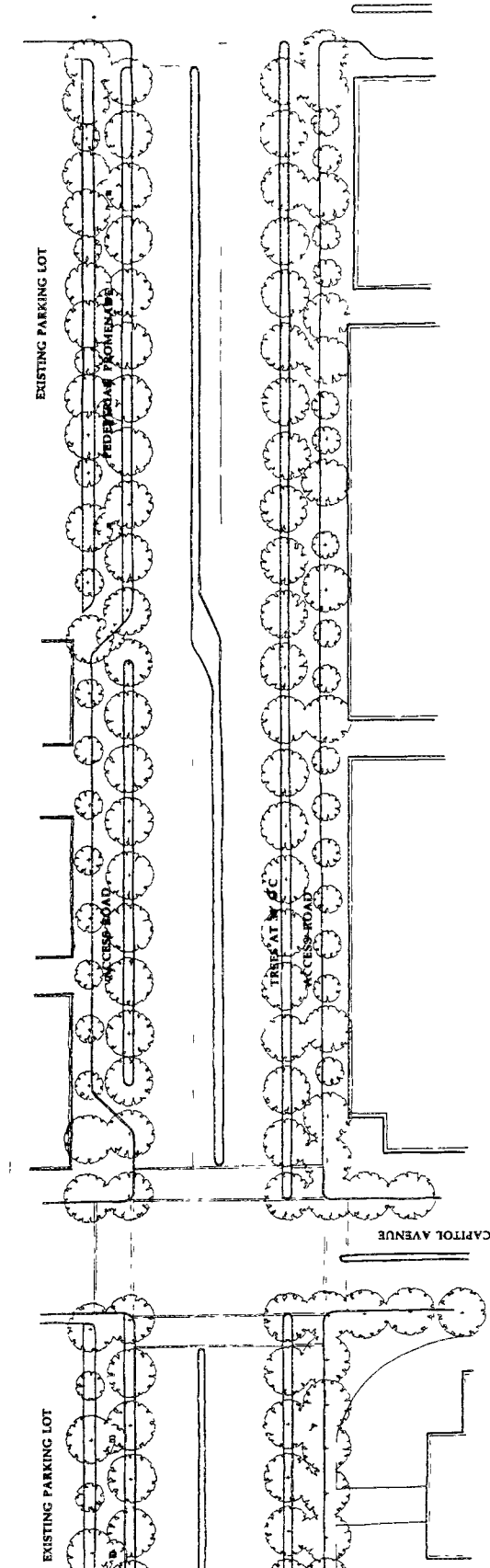


Figure 2.37. Paseo Padre Parkway Plan: Redesign  
 Approximate Scale: 1" = 100'

### *Boulevard Redesign (Figures 2.36 and 2.37)*

One boulevard redesign proposal was developed for Paseo Padre. It calls for narrowing the roadway by reducing lane widths. The 83-foot-wide center roadway still accommodates three lanes of traffic in each direction and a left-turn lane, but it does so with 11.5-foot-wide lanes. The combined pedestrian realm is 43 percent of the total right-of-way. The access lanes are 17 feet wide, allowing one traffic lane and one parallel parking lane. Six-foot-wide raised medians are planted with large-species street trees — such as London Planes — spaced at 30 feet on-center. Sidewalks are widened and the planting strips along them are narrowed and planted with additional trees at similar spacing to those on the medians. Where it makes sense — such as adjacent to an existing parking lot not entered from Paseo Padre — the access road is eliminated in favor of a wide pedestrian promenade lined with trees on both sides.

### **Mowry Avenue**

#### *Existing Configuration (Figures 2.38 and 2.39)*

Mowry Avenue has a 190-foot right-of-way, currently configured with a divided center roadway and frontage roads separated by narrow medians. The center roadway is 96 feet wide, allowing three lanes of traffic in each direction (13-foot lanes) and a left-turn lane. The frontage roads are 30 feet wide, with one traffic lane in each direction and one lane of parking. The seven-foot-wide medians are planted with low shrubs and conifer trees. At intersections, the access lanes curve away from the center and the medians widen to approximately 60 feet, a configuration that derives directly from engineering design standards for residential arterial streets. (The idea was to make the intersections less complex and supposedly safer.)

The street is lined with one- and two-story single-family houses, uniformly set back about 20 feet from the sidewalk. Most houses have prominent garage doors facing the street. The sidewalks in front of the houses are about 4 feet wide and separated from the roadway by narrow planting strips planted sporadically with trees. It was reputed that property values along Mowry and similar streets have fallen.

#### *Opportunities*

Mowry Avenue as it exists today is a bleak residential street. It is wide, and much of its width is taken up by pavement. Wide traffic lanes encourage fast-moving traffic on the frontage roads as well as in the center. The narrow medians and wide two-way frontage roads do little to buffer residences from traffic.

There is an opportunity to make Mowry Avenue a more attractive and better-functioning residential street by applying boulevard principles to it. Wider and more heavily planted medians would help buffer residences from traffic and make the street more attractive. The median bulbs are unnecessary, awkward, and a waste of space. They could be reconfigured to provide neighborhood amenities such as play and recreation spaces.

### *Boulevard Redesigns*

Two fairly similar boulevard designs were developed for Mowry, one that proposes minimal intervention and the other slightly more. In both, the existing medians are widened and replanted, and the access roads are narrowed and made one-way.

#### *Alternate A (Figures 2.36 and 2.37)*

In this minimum-intervention proposal the center roadway remains as is. The combined pedestrian realm is 49 percent of the total right-of-way. The medians are widened to 19 feet and planted with two rows of closely spaced trees and a line of high shrubs along the outer edge. The access roads are narrowed to 18 feet, allowing one traffic lane and one parking lane. The existing median bulbs at intersections remain, but they are planted with trees and turned into play areas.

The main advantage of this design is the reduced implementation expense because four curb-lines remain intact. The main disadvantage is that the large median bulbs at the intersection remain. These large bulbs dilute the boulevard concept because they give the sense that the access roadways and the center roadway are not part of the same street.

#### *Alternate B (Figures 2.38 and 2.39)*

This design proposes additional intervention in the form of wider medians and elimination of the median intersection bulbs. The medians are widened by narrowing the existing center roadway (to 84 feet) and redesigning it to incorporate bicycle lanes. Like Alternate A, the access roads are narrowed to 18 feet, but they are also realigned to continue straight through at intersections. The space gained from the median bulb is incorporated into the residential block and developed into neighborhood play areas. The combined pedestrian realm is 56 percent of the total right-of-way.

Advantages of this scheme are the dedicated bicycle lanes, the narrower center which makes it easier for pedestrians to cross the street, and the simplified intersections.

### **Summary of Responses**

Participants at the presentation were the Assistant City Engineer, a Transportation Engineer, and a Street Maintenance Supervisor. The response was generally skeptical, although some enthusiasm was expressed for the Mowry Avenue proposals.

The main concerns raised were about diminished roadway capacity and political acceptability. One participant expressed the opinion that the public is more concerned with traffic congestion than environmental quality. Another saw the value of street-oriented commercial businesses but stated that the city would go with whatever developers wanted.

There was no preference expressed for one or the other of the Mowry Avenue designs.

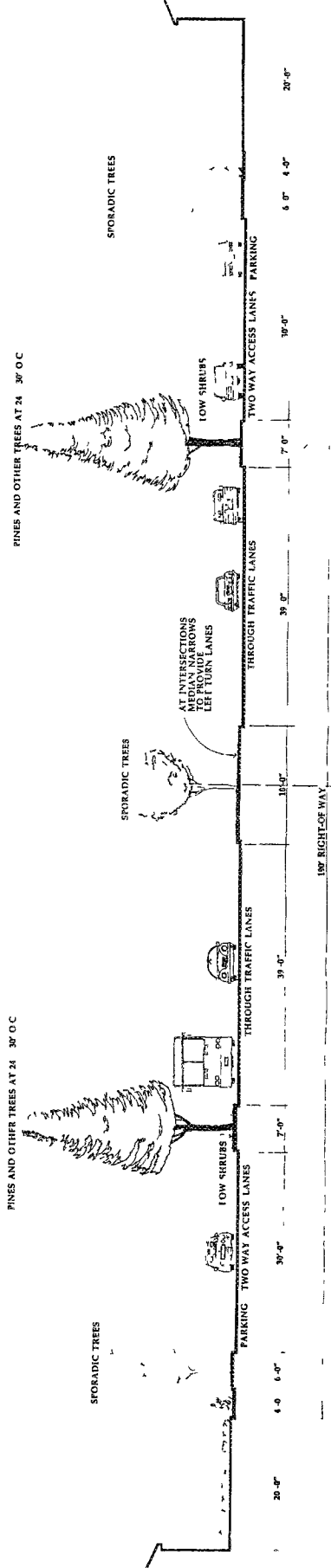


Figure 2.38. Mowry Avenue Section: Existing Configuration

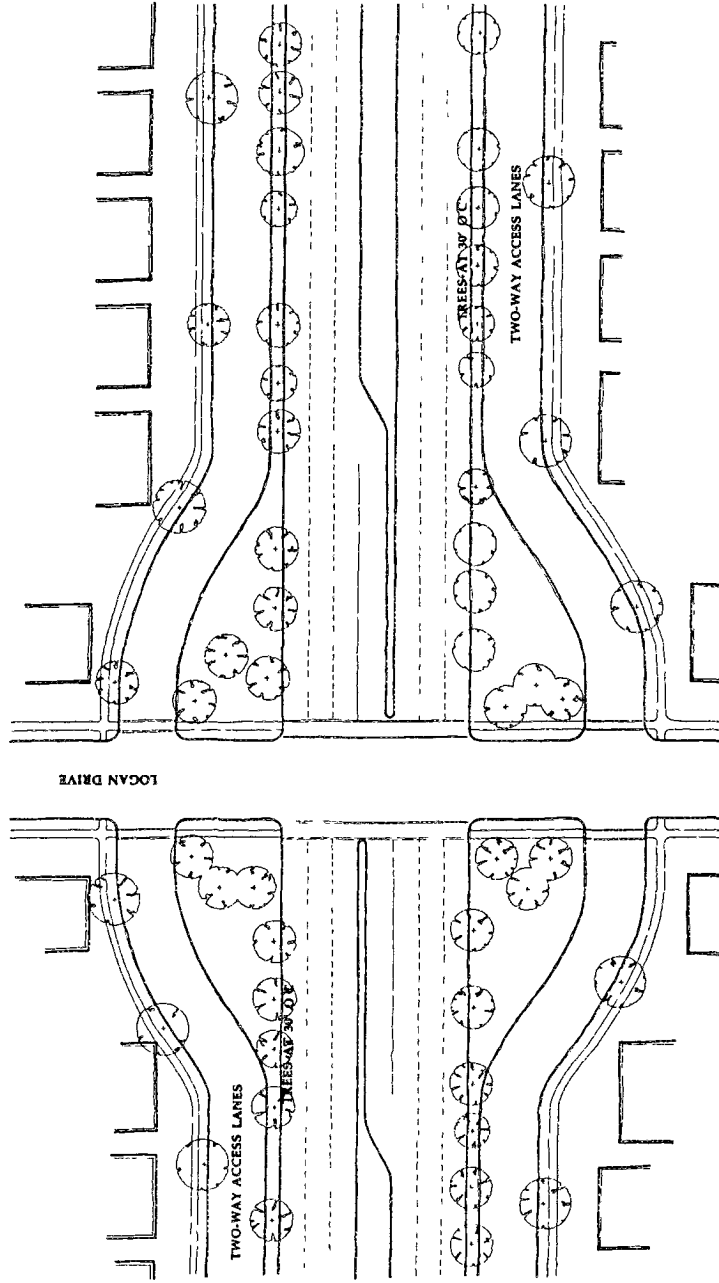


Figure 2.39. Mowry Avenue Plan: Existing Configuration  
 Approximate Scale: 1" = 100'





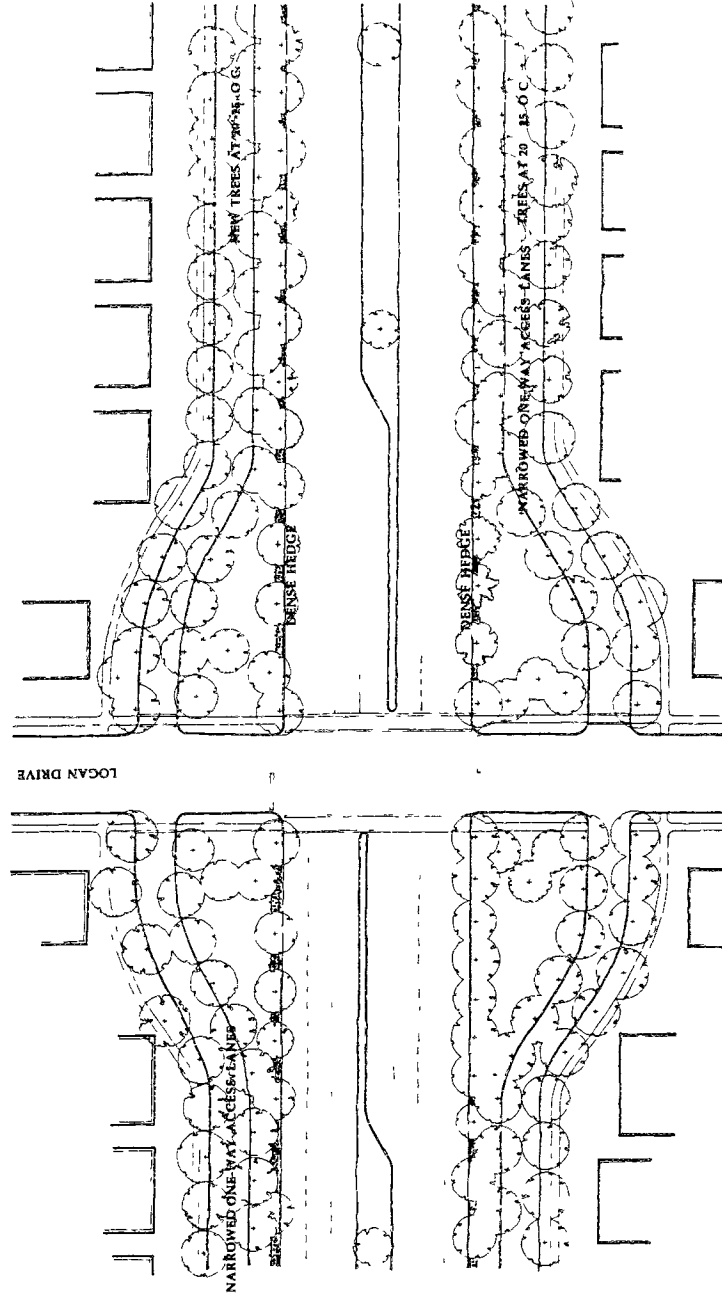


Figure 2.41. Capitol Mall Plan: Redesign Alternate A  
 Approximate Scale: 1" = 100'

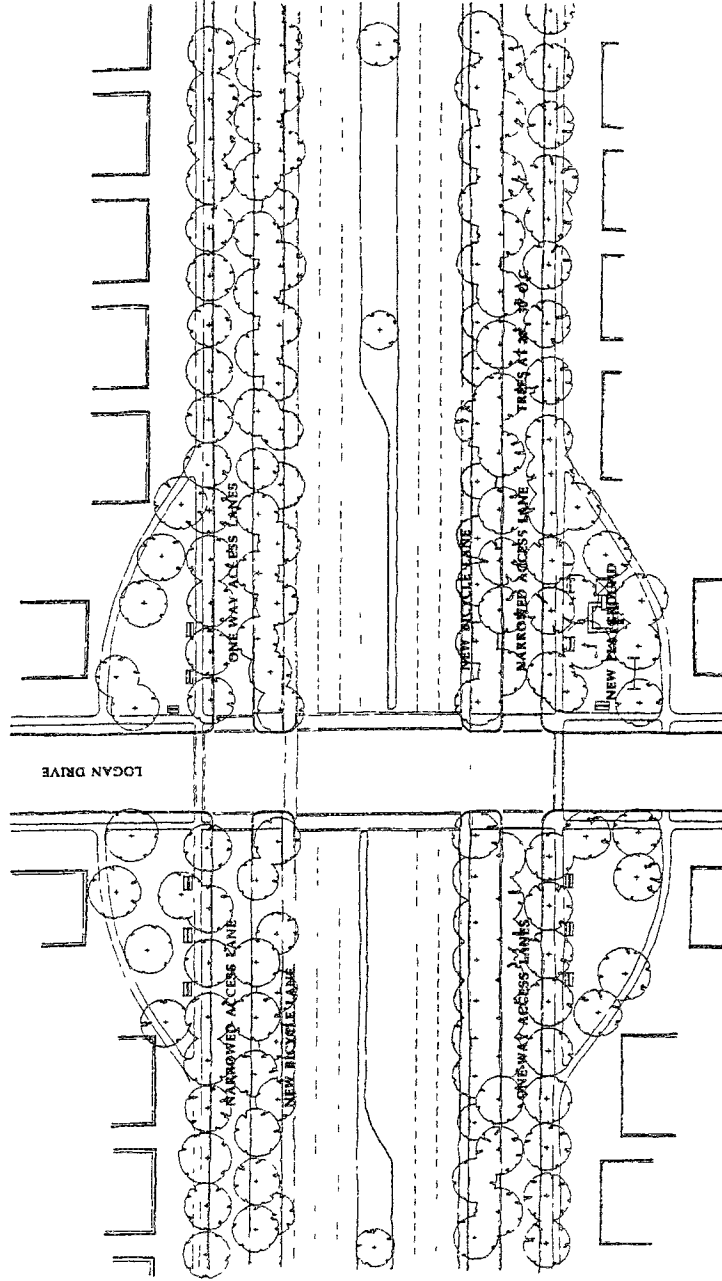


Figure 2.42. Mowry Avenue Plan: Redesign Alternate B  
 Approximate Scale: 1" = 100'

## Summary of the Responses to the Designs and the Guidelines<sup>11</sup>

A summary of the responses to the boulevard designs can be categorized most easily by substantive concerns as raised by the reviewers. To a considerable extent, positive or negative, the responses transcended any particular street type or city type. That is, it cannot be said generally that professionals from one type of city responded differently from those of another. A few modest generalizations are possible, however, regarding the responses of people from particular professional disciplines.

### Overall Safety of the Proposals

Overall safety concerns regarding boulevards were rarely mentioned. Rather, there was a strong tendency to focus on particular issues that involved either safety or ease of movement, particularly at intersections.

### The Pedestrian Realm

Although emphasized in the presentation, the pedestrian realm, as such, with its many interconnecting physical characteristics, was seldom mentioned in responses to designs. Notably, the cities where it was mentioned, and very positively, were San Francisco ("it's doable") and New York, the most urban of the cities. Significantly, too, those who did speak to the pedestrian realm were either the most senior in the governmental hierarchy present or the most policy-oriented.

### Intersection Design

Without question, there were more responses, questions, critiques, and points of view having to do with one or another of the details of intersection design than any other subject. Most notably, respondents first wanted to know how the intersection worked in terms of stoplights, and the like. This was so in all five cities. Respondents were concerned, particularly, with the possible turns and weaves from the access roads and with right turns and weaves from the center lanes across the access lanes. They were also concerned with the width of medians, because of their function of providing storage space for turning vehicles without blocking intersections. Explanations that the proposed designs were the same, in these regards, to boulevards that worked well and had accident rates no higher than more customary major arterials were generally passed over. At the same time, possible solutions, usually involving traffic-light systems, turning lights, notices, stopsigns, and certain turning prohibitions, were regularly forthcoming, mostly in larger cities. The aim of most of these suggestions was to make behavior or drivers at intersections more predictable — that is, to eliminate choices and possible conflicts.

In two cities, San Francisco and Fremont, it was suggested that the access lanes might be directed back to the central lanes before and after each intersection, thereby simplifying the intersections.

One concern, expressed twice, in West Sacramento and Fremont, had to do with the impact of intersection designs on loops — subsurface electronic sensors that trigger the green light for the cross-streets.

and also control light-length in response to the number of cars waiting. The question was whether the loops could be located on side streets at the intersections and still do their job, should they be placed in the medians, or should they be placed immediately prior to the access lane?

There were other such responses to the details of the intersection designs, notably in regards to turning radii and sight distances that might be impacted by trees. These concerns are covered further along.

## Public Transit

Concerns regarding the locations of buses and bus stops were raised in San Francisco, New York City, and Fremont. In all of the proposed designs, buses are proposed to run in the center lanes with stops along the median, similar to what was observed on most of the best boulevards studied. This was considered a problematic location in some cities, especially in New York, because of the interruption of traffic in the fast-moving center lanes. Possible accidents were another concern.

In San Francisco, concerned with a possible light-rail line on Geary Boulevard, the issues were length and width of trolley platforms and conflicts between trolleys and turning autos at intersections. Assembled respondents spent considerable time coming up with possible solutions to anticipated problems, possibly indicating general satisfaction with the boulevard proposal. Generally, the second proposal, Alternate B, with the light rail next to the central lanes but raised slightly to achieve a distinct separate right-of-way, was preferred.

## Access Lanes

Responses to the access lanes had mostly to do with their proposed narrow width and their resultant ability to handle traffic, double-parking, delivery trucks, and, most pointedly, the needs of fire engines. One or another of these issues was raised in each of the five cities. Most participants seemed to want more width, although it was pointed out that slow movement associated with narrower rather than wider access lanes was a characteristic of the better boulevards studied, and that there would be no prohibition to fire trucks or other emergency vehicles stopping in the central traffic lanes. It is not clear if these explanations alleviated respondents' concerns.

In both New York City and San Francisco there was support for the slow movement and parking allowed by the designs for the access roads.

## Trees and Tree Spacing

Somewhat surprisingly, tree location, spacing, and species were mentioned only infrequently, most notably in West Sacramento. There, the concern was over the cone of vision at intersections, as a safety factor, and with spacing. Essentially, the argument was for greater spacing and set-backs from intersections to permit better sight lines. Trees were mentioned positively in New York, with Ocean

Parkway referred to as a model. The design proposals for every city included alternative spacing arrangements. In no case were these commented upon.

In one city, San Francisco, the importance of proper planting and root space was raised, and this led to a long discussion of subsurface utilities and their locations. The essence of the concern was that people responsible for utilities might look at the designs adversely if there were not assurances of adequate space and easy access. This discussion, however, focused on the available space under the sidewalks. The participants did not see that the whole access way could be used as an area for underground utilities. From this it was deduced that they did not fully understand the concept of the pedestrian realm.

### **Trees and Maintenance**

In two cities, New York and Fremont, tree maintenance costs were raised as an issue. Tree maintenance is not a high budget priority in New York, and replacement as well as upkeep is an issue. In that city apparently there is a dependence on citizen volunteers for maintenance.

In Fremont, the comparison was made between gaining funds for street repair versus for tree maintenance and replacement. Respondents felt that it would be much easier to get elected officials' approval for asphalt and roadway maintenance than for landscaping and trees; essentially it was noted that getting money for asphalt was easier than getting money for trees. Departments of Public Works, usually the overseers of street maintenance, are more likely to be concerned with asphalt than with trees. If jurisdictions are fragmented, then recreation and parks agencies are more likely to place a higher priority for trees and tree maintenance in parks than on street trees.

### **Bicycles and Bike Lanes**

In every city, provisions for bikes and bike lanes was raised as a design issue: how was the bicycle provided for in the design? Despite explanations that, on some of the best existing boulevards, bicycles worked fine on the access lanes, with or without special separated lanes, it seemed clear that distinct separate accommodation, such as on Ocean Parkway, where a designated bicycle path runs along the middle of one median, would be the preferred solution.

### **Capacity**

If it was thought that the provision of slow traffic access lanes might lower overall roadway capacity and thereby increase travel times in the central lanes, then this was a design issue. The matter was raised in New York (Queens Boulevard), West Sacramento, and Fremont. Fremont respondents put it most simply: that a more pleasant street was not likely to be considered a good trade-off for slower speeds and more congestion.

## Noise

In one city, Fremont, noise was raised as an issue related to boulevard design. Because of traffic noise, the prospect of buildings and uses oriented directly to the street — i.e., the access street — was counter to emerging practice in places like Fremont, which is to put the ends of buildings, or protective blank walls, facing the street. Respondents said that noise standards might prohibit residential buildings from facing such streets.

## Social, Bureaucratic, and Political Constraints and Constraints of Existing Standards and Norms

In every community, usually during the latter half of the discussion, questions in the form of probable difficulties with or constraints to the proposed designs arose that were political, social, or bureaucratic in nature. In its simplest form the constraint might be that the respondent thought that it would be difficult to get people in the community to change. That is, the design might be fine but people did not easily accept change. Most often the anticipated non-acceptance of the proposals would be because of someone else, not the persons at the meeting.

## Other Agencies and Other Levels of Government

The likelihood of getting some other agency to agree to the proposed design was raised in two or three communities. That is, it might be possible to convince the participant that a boulevard design was appropriate, but the proposal would likely find difficulty elsewhere, either from another city department or from another level of government (the state or the federal government). At the local level, the fire department was mentioned most often as an agency that would need convincing, or, if they were not present, public works engineers. At the state and federal levels the problem, it was reported, was most likely to arise because funding from these sources was likely to be tied to standards and norms to which the boulevard designs did not conform. It was not clear if these admonitions were real or if the respondents were simply looking for someone else to blame for their own reluctance to change.

In this regard, in one community it was suggested that if the people "at the top" could be convinced, they would motivate the people below. In the same community we were advised that while the city was flexible it was state and national standards that were arbitrary and rigid.

## Liability

In at least three communities the issue of liability arose. At some point in the discussion — often when a matter of safety was being discussed and where it could not be shown that data existed to demonstrate that a present practice had a direct safety cause-and-effect relationship or that the proposed design was unsafe — someone would bring up the issue of liability and the large amounts paid out in law suits. Essentially, there seems to be a reluctance to approach or embrace design ideas that do not conform to

existing guidelines for fear of a future liability finding in a court, regardless of whether there is firm data to support the existing guidelines or analysis that shows a non-conforming proposal to actually work well

The fear of liability is a strong deterrent to change

## Data and Experience

In every community, questions were asked that amounted to requests for information and factual data. Questions like how far apart should intersections be spaced, or the relationship between land uses and traffic on boulevards, or the location of bicycle lanes were common

For some, particularly the traffic engineers, there appeared to be a reluctance to accept proposals without data that "proves" them safe even though they could not cite any data that proves existing guidelines to be safe. At the same time, most participants seemed prepared to embrace (or even suggest) a different idea or proposal if they had personally experienced something similar

## The Elusiveness of Wholeness

Overwhelmingly, the research showed that no one or two specific qualities are what make the best boulevards work well or are singularly responsible for increasing or decreasing safety. Rather, it is a combination of characteristics, some having to do with design and some with regulations, working together (sometimes counter-intuitively), that account for the best boulevards. For example, the slow speeds that accompany narrow side access roads mean that vehicles approach intersections slowly and carefully, which makes the multiple and complex turning movements that may be allowed at intersections safer. Similarly, knowing that the intersections are complex induces slower, more careful travel on them by those on the side streets and the access roads. In all likelihood, the slowness of the access lanes and the complexity at intersections inhibits through traffic from using them, encouraging fast traffic to stay in the central lanes. The slow access lanes encourages jaywalking on them, or even strolling along them, which in turn causes drivers to proceed cautiously. Similarly, the closely planted trees on the medians are part of what sets off the pedestrian realm from the central traffic-way, while at the same time providing a pleasant walking space in the pedestrian realm, and a defined, clear, driving space in the center.

But, in almost all cases, respondents seemed to have difficulty accepting or grasping the inter-relatedness of the parts. Rather, it was easy to see and to isolate individual elements of a boulevard proposal as unsafe — turning movements that have potential conflicts (such as right-hand turns from central lanes across the access lanes), medians that are not wide enough to "store" turning vehicles, little or no provisions for double-parking of delivery trucks, tree spacing and trees that proceed to the intersections, and the like — and to make proposals that would presumably make the individual element work better or to simply conclude that a design was faulty

Mostly, the proposals to solve what were seen as design faults would result in larger space requirements or more movement restrictions at intersections, and were likely to be counterproductive in terms



of what had been observed as qualities of the best boulevards. It was remarkably easy, as well, for the boulevard designers to get caught up in these isolated discussions. In general, responses to the boulevard proposals were noteworthy for an inability to perceive and discuss an interrelated whole. Rather, it was relatively easy to focus on single perceived design issues, often those that seemed at odds with standard practices and the guidelines from which they derive.

The focus on details and the emphasis on the smooth functioning of turns and other traffic movements is inconsistent with the logic that is associated with the ways that good boulevards work, especially with the characteristics of the pedestrian realm. It was difficult to get respondents to focus on that

## Conclusions

It is hard to look abstractly or dispassionately at a design for a street that one knows well and for which one might be responsible. Moreover, people, including professionals, tend to develop vested interests in how they have been working and the standards and norms that have governed their decisions and designs. One would like to think that one has been doing things right, albeit in a very imperfect world. Given that likely reality, negative or very cautious responses by local professionals to redesigns of local streets as multiple-roadway boulevards, were to be expected. They had not been requested and their appearance came somewhat "out of the blue."

Nonetheless, the case study designs were received and considered more positively than what may at first appear to be the case in the foregoing report. There was, on the whole, genuine interest expressed by most participants, especially when it was possible to consider these boulevards abstractly. Moreover, in almost every case the local professionals asked informational questions related to the research: What is the proper distance between intersections? What are the appropriate uses of these kinds of streets? What is the experience with jay-walking? And the like.

In those few cases (as well as showings to academically based professionals) where the video/film was shown as a way of explaining boulevards and the research on them, the response was always very positive. The video/film images show clearly how multiple roadway boulevards work in practice, and they illustrate clearly the principles that derive from the research.

Substantively, it was difficult to get reviewers to focus on the pedestrian realm and to understand that the whole realm is essentially an expanded sidewalk on which automobiles and service vehicles are permitted. This matter goes hand-in-hand with the problem of "wholeness" or inter-relatedness. It is relatively easy to pinpoint design details or details of regulation — trees that extend all the way to an intersection, a narrow parking lane, or a permitted right turn from the center lane across access road traffic are but three examples — and to not realize that these details, together, are what make the boulevard work well, that they are attributes rather than problems. To a doubter, these single issues may be held as absolute reasons not to consider boulevards

Many responses to the proposed boulevards can be grouped under a heading of "professional culture." The roots of roadway design guidelines are strongly embedded in the functional classification of streets, especially for transportation and civil engineers. Designs that deviate from those guidelines and from common practice are suspect and will be hard to implement. In some cases this reluctance to look anew at roadway designs is because of institutional and liability reasons rather than an abiding faith in the design guidelines as they stand.

Though traffic and transportation engineers may accept existing standards even though they may not be strongly based on data or objective analysis (they may assume existing standards are based on such data, while in reality none can be pointed to), they will not easily part with those standards without compelling research and data that a new idea works well and is safe. In other words, a very considerable amount of data and "proof" will be necessary to get people to part from existing practice that may not, in itself, be based on data or "proof," and in fact may be unsafe.

Professionals more associated with transportation planning or pedestrian planning and/or located in community development or planning offices tend to be more accepting of multi-functional streets, and therefore of boulevards, than the traffic engineers.

Experience counts! When a reviewer, professional or otherwise, can relate a proposal to a successful design that he or she has actually experienced, he or she will tend to be more accepting of it even if it runs counter to existing norms. The video/film may constitute a half-way house in terms of supplying at least visual experience that reviewers are otherwise lacking.

On a socio-political level, it is relatively easy to pass the buck and therefore avoid endorsing or rejecting boulevard proposals. Simply, this means saying that while one reviewer might be convinced of the goodness of a new proposal, it would be another agency, at the same or higher level, that would be the stumbling block or would have to be convinced. In regards to boulevard proposals, the most frequently named "others" were fire departments at the local level, and state or federal funding agencies at the non-local level. In the end, though, the observation that it was mostly the elected officials and the bureaucratic bosses that had to be convinced, not the local professions (who would carry out any policy), was most telling. This is no minor stumbling block. Boulevards, because of their multi-functional nature, need the cooperation of many different agencies and departments as well as the support of the local community if they are to become reality. Anyone of them can block implementation or compromise the design by insisting on some detail.

Fear of law suits, and liability, is an extraordinary concern of local professionals and may have more to do with the reluctance to consider new approaches to roadway design than any other reason, especially if the proposed guidelines cast doubt on previous and existing standards and norms. Existing standards provide, at least, a fall-back position of some strength and general acceptance, regardless of their appropriateness. To cast doubt on them and at the same time look to new design guidelines that

run counter to generations of standards that increase space for autos and trucks may be seen as looking for trouble.

Time and money constraints limited the number of case studies possible, as well as the number of local professionals who could be contracted and who could review the boulevard proposals. Other approaches would be possible, including that of showing local professionals' designs for streets in other jurisdictions than their own. A methodology that involved more steps — presenting the research at one meeting and the case study proposals at another — might have elicited different responses. Certainly it would be useful to meet with people from all relevant agencies in a community, perhaps at one time, to avoid buck-passing. More private, one-on-one meetings with professionals might also have produced different responses. Notwithstanding these problems and alternative approaches to gaining reactions to these ideas for multiple roadway boulevards, we suspect that the responses are representative of communities and of professionals. And, certainly they have been helpful in the preparation of the design guidelines for these kinds of streets, which follow.

### III. GUIDELINES FOR BOULEVARDS DESIGN

#### Introduction to the Guidelines

##### The purpose of the guidelines

The first purpose of these guidelines is to create design standards and norms, specific to boulevards, that recognize their uniqueness as balanced multi-purpose streets

The multiple-roadway boulevard, when designed appropriately, is by its nature multi-functional. It serves large volumes of through traffic, slow-moving access traffic, pedestrians, and bicycles, and is an appropriate setting for a wide variety of land uses and building densities

The unique feature of the boulevard is that all uses are accommodated in a balanced way, not allowing any one use or mode of travel to dominate the street. This feature of boulevards makes them stand apart from the accepted tenet of "functional categorization of streets," a philosophy of street design that has been dominant especially since the Second World War. The central concern of functional categorization is to resolve the conflict between the two primary functions of streets—through movement and access to adjacent property. All streets are classified according to their expected primary function. Main streets are designated primarily for movement, and are thus restricted in access to adjacent property. Local streets are designated mainly for access, and are thus designed to discourage through traffic. Streets designated as arterials are the widest and carry most traffic. Therefore, access to abutting uses is restricted, and intersections are spaced widely apart (Figure 3.1.1)<sup>12</sup>

The boulevard is a different resolution to the problem of potential conflict between different speeds and modes of traffic, a solution that dates from the middle of the nineteenth century. Boulevards have a central roadway for fast through traffic, flanked by one-way access roads separated from the center by tree-lined medians. This form allows pedestrians and slow-moving local traffic to co-exist and interface with fast-moving through traffic on the same street, thus retaining an important traditional social function of the main streets of cities as places of encounter.<sup>13</sup>

A second purpose of these guidelines is to establish a view of boulevards as complex wholes. It is important to understand that boulevards are complex systems combining diverse movement patterns, uses, activities, and social interactions. Social interaction, and the existence of city streets as a social milieu, is both the medium and the result of everyday activities

Besides being a complex in themselves, boulevards can also be an important part of the larger system of city streets and spaces. Their location and design should bear this in mind; they can serve to actively enhance the organization and the clarity of the city, as well as the beauty of the street system in which they are nested.

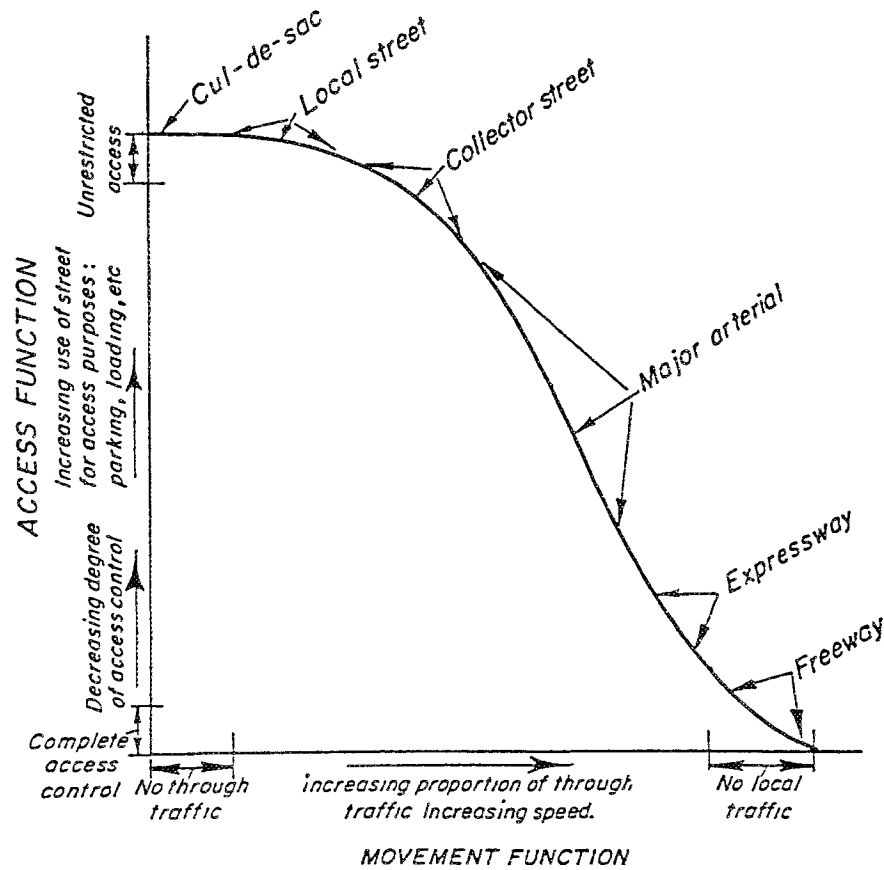


Figure 3.1.1. Functional Classification Diagram

From "Fundamentals of Traffic Engineering," Institute of Transportation Engineers (1992).

The case studies in this report, and the many boulevards studied in the first phase of this research, demonstrate that boulevards are also flexible and adaptable frameworks for urban life; they survive change well from rural to intensely urban environments.

A third purpose of these guidelines is to point to the fact that the design and form of these streets is significant, and to attempt to set down precepts by which their form can be improved. This issue is important not only with respect to the behavior on these streets themselves, issues of safety, beauty, grace, and interest on the street as one is walking or driving along it, but also with respect to the public realm of the city as a whole. These streets are among the major elements that produce the urban form of a city. Their quality becomes to a considerable extent the quality of the city.

### Who are the guidelines for?

These guidelines have a broad aim. They are for the use of urban designers, architects, city planners, landscape designers, traffic engineers, city officials in charge of street design and improvement,

developers, citizen groups, and the general public. They are intended to serve as a tool for people to aid them in looking at and analyzing problems of existing streets, or of proposed new streets, and they can direct attention to necessary changes that will help make arterial streets in our cities better.

### **The basis for the guidelines**

The guidelines derive from insights into the nature of boulevards that were achieved in several ways. Much knowledge was gained as a result of research about boulevards, particularly that which was reported in a previous report.<sup>14</sup> Some of this knowledge was gained in making the case study designs (reported herein), and discussing the responses to them. Some of these insights are intuitions born out of many hours of observation and immediate experience on boulevards, and reflections on why some things work better than others.

It is not possible to avoid using such intuitive and experience-based knowledge in design. The multitude of issues defies exhaustive scientific analysis, and the issues are sometimes so complex and interrelated that finding complete scientific grounding for them is difficult if not impossible. Yet it is also impossible to construct a boulevard without providing some concrete answers to questions of which there is very limited knowledge (for instance: what is a reasonable length for a boulevard in a particular context, and having determined that variable—what should be the spacing between primary attractions along it?)

### **The organization of the guidelines**

As has been stressed, boulevards are integrated wholes. One must therefore beware of reducing them to a series of issues, for which guideline dimensions and solutions are given: the vision of the whole street, and the way that the different aspects interact, will be lost.

Therefore, a series of interrelated qualities that are crucial to the construction of a good boulevard has been identified. These are presented in the guidelines. However, as important as each quality is, perhaps even more important are the connections and the relationships between the qualities. Any particular solution, an achievement of one quality in the design of a boulevard, has to amplify and reinforce previous decisions, and in turn has to be respected and strengthened by subsequent decisions.

To make that task easier, the guidelines are generally organized from the larger qualities that a boulevard must have to those that are smaller in scale. They are also divided into four groups. The first group (guidelines 1-2) deals with the larger questions of the location of a boulevard within the city, its role, and the surrounding development that make boulevards a sensible proposition. The second group (guidelines 3-6) deals with questions of the overall design of boulevards, their major parts, and the contribution that each part makes. The third group (guidelines 7-14) deals with particular and crucial design aspects of the various parts. Finally, the fourth group (guidelines 15-16) includes optional enhancements that can improve a boulevard, or help deal with particular problems.

## The List of Guidelines

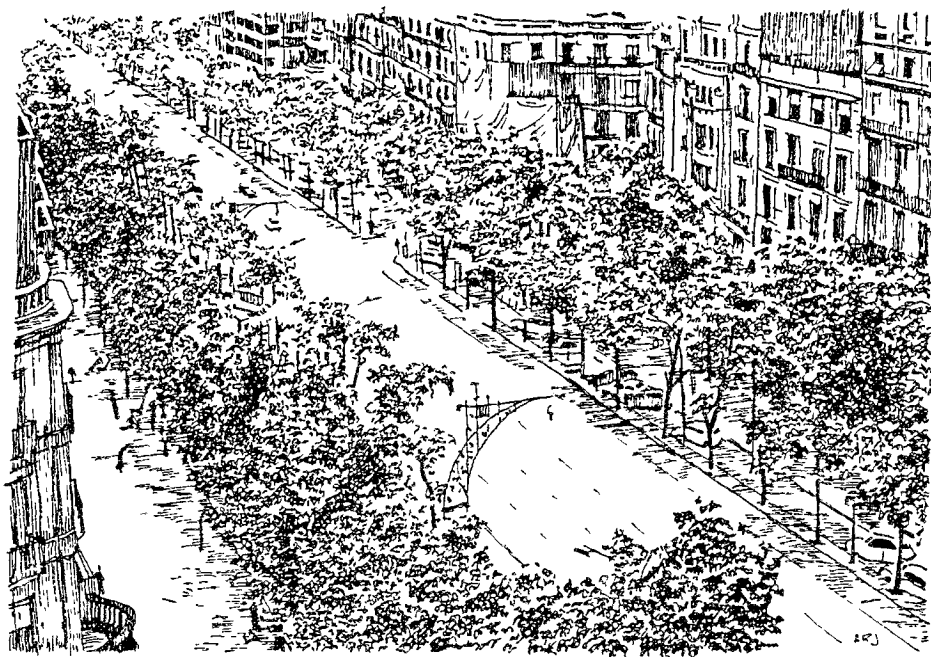
1. Location, context, and uses of boulevards
2. Buildings that face the street  
\* \* \*
3. Boulevard realms and overall size
4. The through-going central realm
5. The pedestrian realm
6. Continuous tree-lined median that bounds the realms  
\* \* \*
7. Rows of trees and tree-spacing
8. Public transport
9. Parking
10. Lane widths
11. Bicycle lanes
12. The distribution of pedestrian space between sidewalk and median
13. Intersection design
14. Traffic Controls  
\* \* \*
15. Benches and planters on the median discourage mid-block crossings
16. Differentiating the roadways.

## How to use the guidelines

The use of the guidelines depends very much on the context of the desired intervention. The guidelines can be used to design new boulevards in a new town or development, to renovate an existing boulevard that was faultily designed or has deteriorated over time, or to transform an existing arterial street into a boulevard. The case studies, described previously, indicate some of the various contexts in which boulevards may be appropriate or could represent a substantial improvement in the quality of a street and of street life. The guidelines could also be used to make small incremental improvements to existing streets in order to make them better.

The first eight guidelines, together, create the sense of the boulevard as an integrated whole, and thus should be read regardless of any particular design issue that may be at hand. One can then turn attention to any particular problem one is concerned with, without losing the sense of the whole street.

## 1. THE LOCATION, CONTEXT, AND USES OF BOULEVARDS



Boulevards have a paradoxical nature that is difficult to grasp and appreciate, and this is perhaps the reason why they have not always been well-treated. They are at once normal and extraordinary. The uses they harbor, the buildings that align them, and the humdrum of traffic that they accommodate are the stuff of normal everyday life, and yet the combination of all these elements together, and the sheer space and amenities they contain, make boulevards spectacular, unique, and memorable when they work well.<sup>15</sup>

In the United States boulevards exist, or there is an opportunity for them to exist, in at least six distinct contexts

- *Boulevards that already exist.* These date from late 19th century and early 20th century suburbanization and city expansion. Often, they are run down or misused because they have been redefined as arterial streets alone. The functioning of the access ways as extended pedestrian realms (see Section 5, The Pedestrian Realm) has been eroded by traffic arrangements and/or tree removal, or by other careless physical changes and lack of maintenance over the years. Some of them were not well-designed in the first place.
- *Existing inner-city major streets or expressways.* Usually located immediately outside the initial urban core, these streets connect it to outlying residential areas. Historically these streets may have been



the transportation spines of the first wave of suburbanization of the 1920s until and immediately after W.W.II They are wide streets and often form part of the major physical structure of the city.

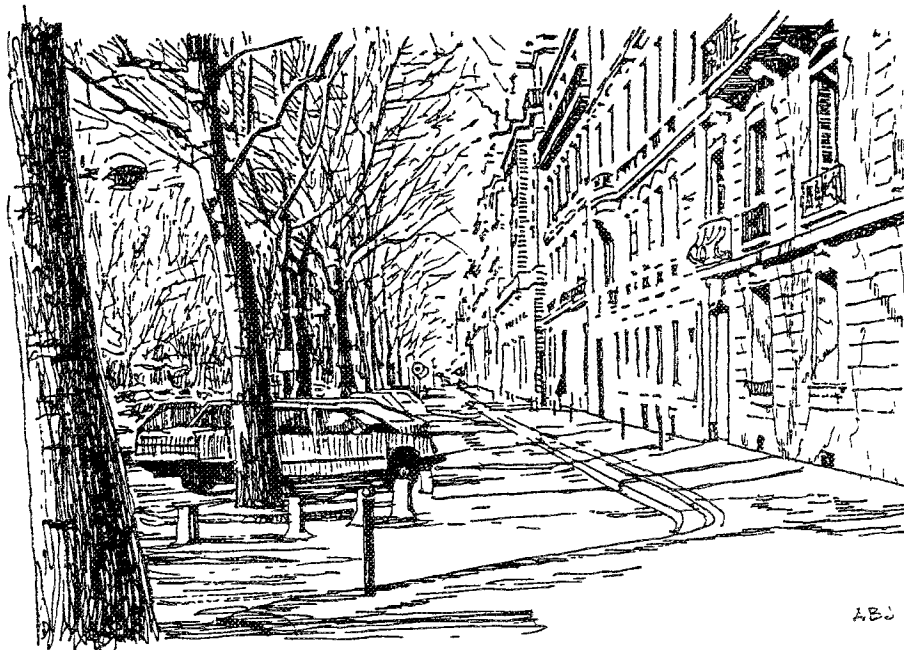
- *Existing "Strip Development" streets.* These were country roads that, as suburbanization progressed around them, were turned, gradually, into auto-based commercial streets in the late 1940s and in the early 1950s. These streets are typified by low-density commercial uses, often set back behind parking lots, with direct access from the street, but a density too low for pedestrian movement between shops. Often these areas are used and occupied by people with relatively lesser means than they originally catered to, and with a greater need for public transit and pedestrian access. Transformation of the housing along them, or in their vicinity, from single-family owner-occupiers to multi-family rental, condominiums, or elderly housing that tends to raise the residential density in their vicinity is also common. These types of streets hold perhaps the greatest potential for improvement as boulevards.
- *Existing suburban residential expressways.* Some early suburbs were built with arterial expressways that had a similar cross-section to boulevards, with the difference of somewhat wider dimensions, and two-way frontage roads. These streets may be experiencing difficulties because of falling land values along them. The wide two-way access streets fail to create a comfortable pedestrian environment. The medians rarely act as true buffers between the local access way and the grind and noise of fast traffic on the center roadway. Intervention here is more to improve the overall environment than it is for functional reasons. Roadway changes that accompany increased density and a mix of new uses would also be appropriate.
- *Existing suburban commercial arterials.* These streets were designed within the standards of modern traffic engineering. Some are experiencing changes that make the application of boulevards to them seem promising. First comes the increase in pedestrian and bicycle traffic that is a result of the extension of mass transit systems into suburban areas. Another element is the changing economics of housing that make multi-unit development more probable along such streets or in their vicinity. Another element is the suburbanization of work that creates a demand for nearby services such as small cafés and lunch spots that need a street-based exposure for their economic viability. Many suburban cities also try to promote a stronger civic image in order to attract commercial development. A boulevard type of street can address these multiple challenges.
- *Major traffic streets in new urban or suburban development.* New streets are built constantly and some need be more significant than others. The guidelines for choosing boulevard locations, which follow, are for new streets as well as for conversion of existing streets.

It is significant that boulevards exist, and have a potential to exist, in these six very different contexts. It attests to the versatility of this street form, and to its ability to change and adapt as the area changes around it. Also, due to its regular form, it is able to unify functionally and socially disparate areas.

### Guidelines for choosing the location of a boulevard:

- Boulevards are appropriate where there is a need to carry both through traffic and local traffic, where there is good reason for the through traffic to move faster than the local traffic and/or where there is a real or potential conflict between the two traffic types
- Boulevards are appropriate for streets that, by virtue of their size and/or location, are, or can become, significant elements in the city. They have a potential to become special places
- Boulevards usually carry a significant amount of through traffic (an ADT of about 10,000 seems to be a reasonable minimum figure above which a boulevard begins to make sense)
- Multiple Roadway Boulevards usually have abutting uses that face the street with direct pedestrian access from the street, or have a potential to do so (see Section 2, Buildings that Face the Street)
- Boulevards are appropriate where there is either a significant amount of pedestrians that need to cross the street, or if there is a potential desire to do so. Commercial streets, streets with high residential density, streets that incorporate public transit, streets with a significant presence of public institutions, or streets that border a public park may be such streets, and may create a conflict between fast-moving through traffic and the desire of many pedestrians to cross the street in safety

## 2. BUILDINGS THAT FACE THE STREET



*Boulevard Courcelles, Paris*

**Boulevards do not make sense where buildings do not face the street.**

Major differences that separate boulevards from ordinary arterial streets are that, on boulevards, access to the abutting properties is not limited and the distance between intersections is not regulated. On arterial streets, accepted standards recommend a wide spacing between intersections and discourage direct access to abutting property, suggesting access from side streets<sup>16</sup> These standards have resulted in large stretches of development, both commercial and residential, that turn their backs onto the main movement space.<sup>17</sup>

Building frontage on streets, besides making a contribution to pedestrian accessibility and safety, also renders the structure of the city more visible as one is moving through it. On predominantly residential boulevards, it makes feasible commercial development in smaller increments, because visibility and connection to the urban fabric are immediate, and stores need not conglomerate in large malls to attract people even without being visible from movement paths

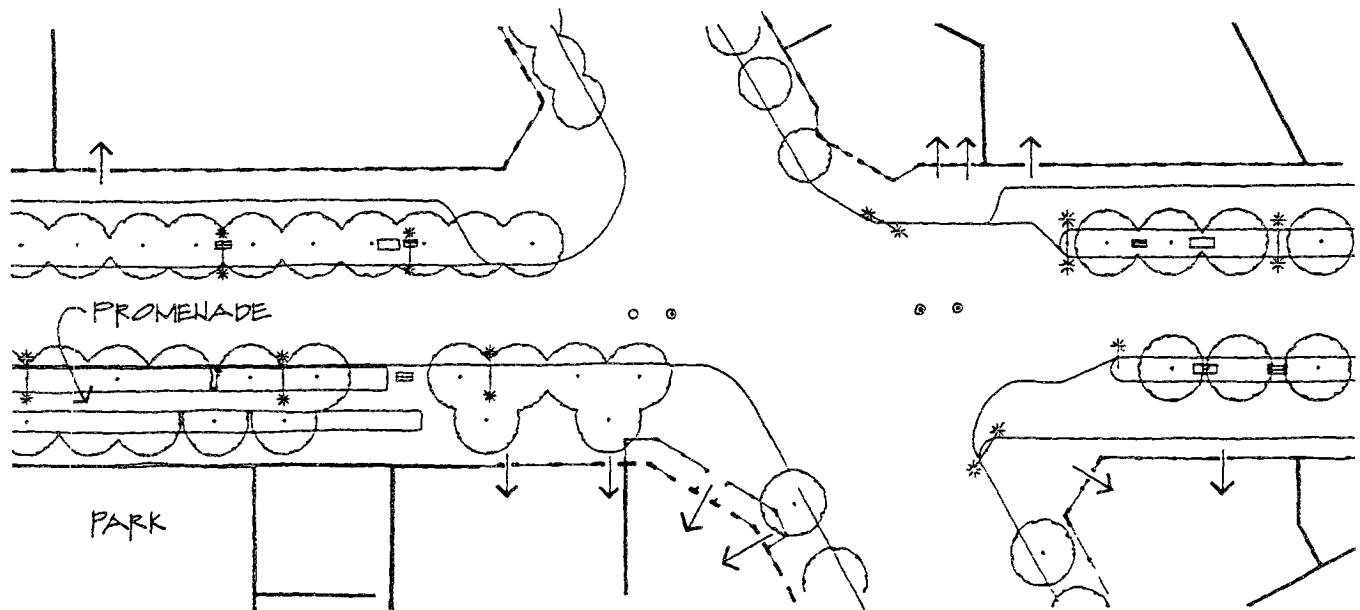
A recent regulatory constraint to buildings that face the street are noise-level regulations that mandate sound walls along streets with heavy traffic. On boulevards the medians and access lanes distance the abutting buildings from the noise and air pollution generated in the center through lanes, and an overall improved pedestrian environment can prove effective in reducing the psychological impact of traffic. In time, uses that are less adversely impacted by the traffic — and profit from the added visibility

such as multi-family apartment houses, or office buildings with shopping at ground floor — could be developed and will shield the residential areas behind them.

**Guidelines for buildings that face the street:**

- Wherever possible, buildings on boulevards should face the street and have direct pedestrian access from the sidewalk. A boulevard configuration can help abate the negative impacts of traffic on uses that face a busy traffic artery. On existing arterials where buildings face away from the street, permitting new buildings to face the street may open opportunities for conversion of parking lots into more useful development.
- A particular opportunity can occur where a boulevard borders a public park, or a major institution like a museum, educational facility, library, or civic center. In this case the boulevard can be one-sided, with an access street allowing car access only on the side with ordinary buildings. The other side is devoted completely to a pedestrian promenade. Such treatment would reinforce the public garden or the institution as a major destination along a boulevard.<sup>18</sup>
- If only one side of the street has street-facing buildings, and the other side has a commercial development surrounded by parking lots. A possibility is to construct a one-sided boulevard, with a pedestrian promenade along the parking lot frontage in order to mitigate the impact of the open parking lot expanse. Perhaps in time, part of the parking lot can be developed with commercial buildings that turn their front to the street.

**Illustrative Diagram:**



**Figure 3.2.1. Plan: Boulevard Courcelles, Paris**  
 This existing boulevard incorporates many of the guideline ideas.

### 3. BOULEVARD REALMS AND OVERALL SIZE



*Esplanada, Chico, Cal*

The boulevard is made up of two realms. In the center is a wide roadway, at least two and often three lanes in each direction, or multiple lanes going in one direction only. This roadway is devoted to relatively fast through-going traffic (see Section 4, The Through-going Central Realm). On the sides of this roadway, and separating it from the abutting buildings, are the pedestrian realms (for more detail see Section 5, The Pedestrian Realm). These include the sidewalk, a narrow access street that includes at least one parking lane and one moving lane, and a continuous tree-lined median (for more detail see Section 6, Continuous Tree-lined Median that Bounds the Realms). Movement in these realms is slow, and mainly intended to serve as access to the buildings and uses along the street, and for slow, local traffic.

The tree-planted median can be of varying width. Its function is to form a boundary to the pedestrian realm, protecting it from the fast-moving traffic on the central roadway. As such, it is also the interface between the local pedestrian realm and the through-going center realm. Generally, on a good boulevard, the distribution of land between the pedestrian realms and the through-going realm is at least 50 percent-50 percent. Thus, if we look at a section of the street, at least half of the right-of-way will be devoted to medians, access roads, and sidewalks and half will be devoted to the fast-moving car lanes (Figure 3 3 1) <sup>19</sup>

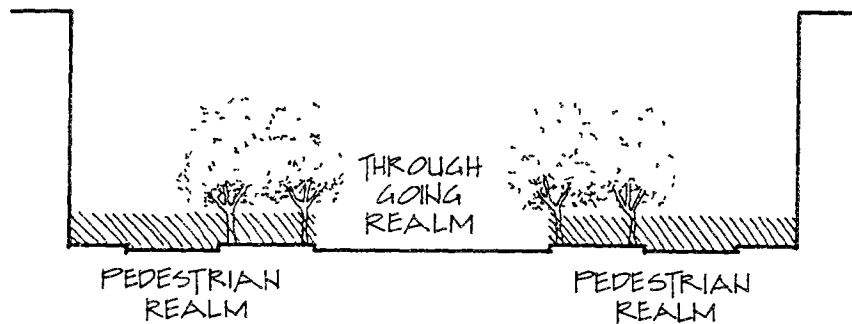


Figure 3.3.1. Boulevard Realms

One hundred feet is perhaps the absolute minimum right-of-way required for a boulevard where two-way through traffic is possible<sup>20</sup> With this width, a hypothetical configuration would be four central lanes, each 10 feet wide, and access ways 15 feet wide that allow for one passing lane and one parking lane. The medians are 5 feet in width, and the sidewalks are 10 feet wide each. (In this configuration, the balance between the pedestrian realm and the center realm is 60/40.) This configuration is very tight indeed. A right-of-way of 125 feet to 140 feet is much easier to work with. Existing rights-of-way of such width can be found in many cities (Figure 3.3.2).

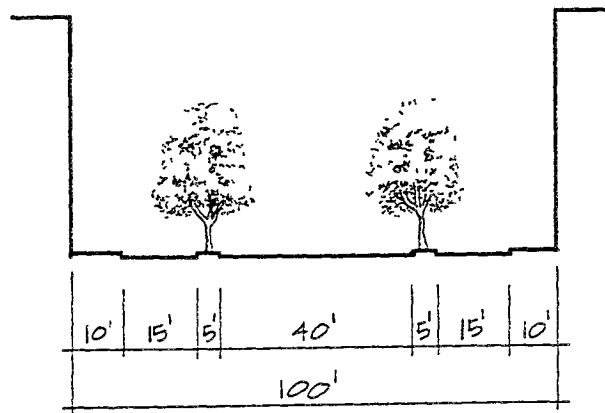


Figure 3.3.2. Hypothetical Minimum-Width Boulevard

Is there a maximum width for boulevards? This is a harder question to answer and perhaps also less critical, because there are many real economic pressures that help limit the size of street rights-of-way. Experience indicates that boulevards can still function well when the overall width reaches about 220 feet (Ocean and Eastern Parkways in Brooklyn are 210 feet wide, the Avenue Grand Armée [the extension of the Champs Elysée] in Paris is 230 feet wide) (Figure 3.3.3).

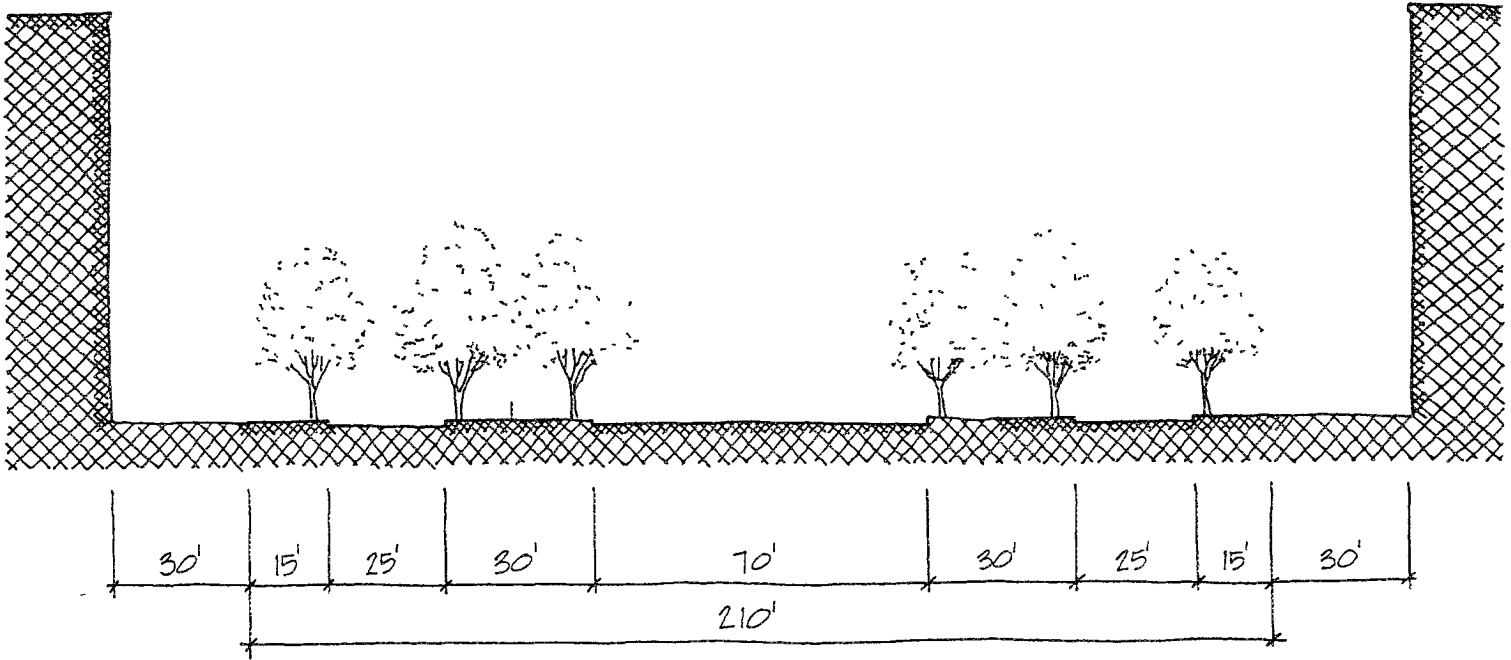


Figure 3.3.3. Ocean Parkway Section

There are some concerns that may make it difficult to make boulevards much wider with success. Basically, for a good boulevard, access ways cannot be much wider than 28 feet, in which one moving lane and two parking lanes are handsomely accommodated. Access roads wider than this would create the possibility for two lanes of moving traffic, or enable increased speeds, eroding the nature of the pedestrian realm. Therefore, the possibilities for widening the street are in the central roadway, carrying four or five lanes of traffic in each direction, or in wider sidewalks or medians. In order to maintain balance between the realms, the widening would have to occur in both. A problem with very wide sidewalks is that the pedestrian traffic needs to be large in order to enliven the street, and make it pleasant for walking. Few locations attract that many pedestrians, the Paseo de Gracia in Barcelona and the Champs Elysée are two that come to mind. If the wide medians are treated more as a park than as a promenade (as along the Park Presidio in San Francisco), then the perception of the whole street as one entity breaks down, and it is perceived as three different streets.

A problem associated with very wide center realms and many fast-moving traffic lanes is that pedestrian crossing becomes difficult and hazardous. On commercial streets, each side of the street then works independently in terms of supporting shops and businesses. Not many streets are located well enough, and have enough prestige and staying power to be able to handle this problem, without businesses deteriorating. The Champs Elysée is perhaps a contrary example that proves the point, because it is unique.

The following is a table of overall widths and realm widths of some boulevards, and some of the case study designs:

Street	Overall width, ft.	Pedestrian Realm, ft	Through-Going Central Realm, ft	Pedestrian/Center Realm Ratio	Ped Realm Total/Overall Width Ratio
Ave Grand Armée, Paris	230	70 + 70	89	0.79	0.61
Ave Montaigne, Paris	126	42 + 42	42	1.00	0.67
Paseo de Gracia, Barcelona	200	70 + 70	60	1.17	0.70
The Diagonal, Barcelona	165	57.5 + 57.5	50	1.15	0.70
Ocean Parkway, Brooklyn, NYC	210	70 + 70	70	1.00	0.67
K-Street, Washington, DC	150	51 + 51	48	1.06	0.68
The Esplanade, Chico, CA	165	40 + 63	64	0.62 and 0.98	0.62
Geary Blvd, San Francisco design	125	33 + 33	60	0.55	0.53
West Capitol Ave Sacramento, CA design	134	42 + 42	50	0.84	0.63
Grand Concourse, Bronx, NYC, existing design	172 172	20 + 20 61 + 61	135 50	0.15 1.22	0.23 0.71

Figure 3.3.4. Boulevard Realm Widths

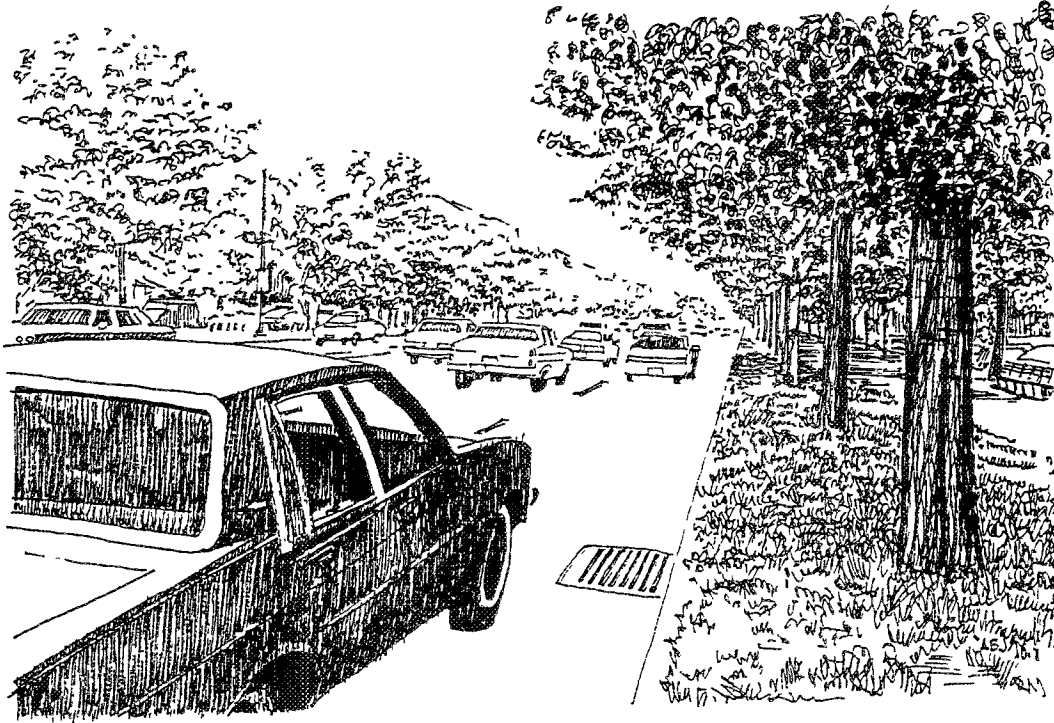
### Guidelines for boulevards' overall size and realms

The following are the key points concerning overall size and the relative dimensions of each realm

- A right-of-way of 100 feet is the feasible minimum for boulevard design. This allows a central roadway that is 40 feet wide, providing two through-going lanes in each direction, flanked by 30-foot-wide pedestrian realms on each side — enough for one moving lane, one parking lane, a sidewalk, and a narrow median.
- Right-of-way dimensions of between 125 feet and 210 feet allow for more flexibility in the design of a boulevard, more generous pedestrian realms, and perhaps more capacity in the central roadway. This configuration permits more flexibility in meeting requirements of other travel modes.
- A minimum of 40 feet is needed for the through lanes. Fifty feet are needed if a left-turning lane is necessary.
- The establishment of a strong pedestrian realm is of primary importance to the creation of a well-functioning and safe boulevard. A balance between the central and side realms is critical. On the best boulevards, the total area given to the pedestrian realm is never less than 50 percent of the total width of the right-of-way, and often approaches 60 to 70 percent. In fact, the previous table shows that, on wider boulevards, the portion of the width that is given to the pedestrian realm is greater.



#### 4. THE THROUGH-GOING CENTRAL REALM



The boulevard's function as a carrier of relatively rapid and non-local traffic is just as important as the local and pedestrian access function. Boulevards form connections over the city as a whole, and allow for easier and calmer through driving than on normally configured streets. There is less interference from parking and service vehicles.

A minimum of two lanes in each direction is needed to serve substantial amounts of traffic. Three lanes in each direction allow for more flexibility in traffic arrangements, and for the possibility of devoting a lane to exclusive use of public transport vehicles. Three lanes in each direction can handle an ADT of 50,000-75,000 vehicles with no difficulty (Ocean Parkway in Brooklyn, New York, has an ADT of 74,400; Eastern Parkway, also in Brooklyn, has an ADT of 61,000; K-Street in Washington, D.C., with two lanes of through traffic in each direction and no left-turn lanes, has an ADT of 51,850)

With more than three lanes in each direction, a boulevard may become too wide and hinder pedestrian crossings.

It is possible to have the through traffic move in one direction only (Avenue Montaigne in Paris, for example, is one-way throughout, with only a public transit lane moving against the flow. Paseo de Gracia in Barcelona is asymmetric in its traffic arrangement, with two lanes going in one direction and four in the other).

Parking on the center-realm side of the median should be discouraged, although it occurs on some boulevards, particularly in Paris. Parking in the center realm reduces the benefits gained by the access road, namely facilitating uninterrupted through traffic. Parking in the center can also overwhelm the median as a part of the pedestrian realm by surrounding it with cars, and makes it impossible to use the lane next to the median as a dedicated public transport lane.

Left-turn lanes can be accommodated in an alternating lane in the center.

### Guidelines for design of the center realm

- The overall width of the center realm should be determined by balancing considerations of the available right-of-way (roughly 50 percent of the right-of-way), the traffic capacity desired, and the need for pedestrians to cross the street with safety.
- A width of 50 feet can accommodate two lanes in each direction and an alternating left-turn lane. A width of 70 feet accommodates three lanes in each direction and a left-turn lane, and implies an overall boulevard width of between 100 and 175 feet.
- If necessary and possible, devote the lane next to the median to public transit. Public transit is best accommodated in the center, to facilitate speed and to accommodate the large vehicle size. The curb lane can be somewhat wider than the other lanes to accommodate transit vehicles (see Section 10, Lane Widths)
- It is advisable to provide a refuge for pedestrians in the center of the boulevard. This can be as little as a wide bollard, as is often used in Parisian streets. A refuge becomes necessary if traffic considerations require that the number of lanes be greater than three in each direction.

### Illustrative Diagrams:

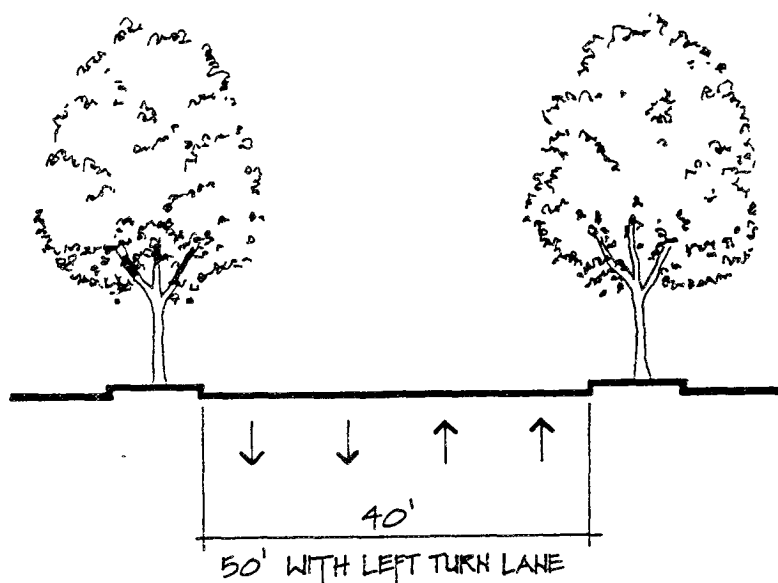


Figure 3.4.1. Center Realm with Two Traffic Lanes Each Direction

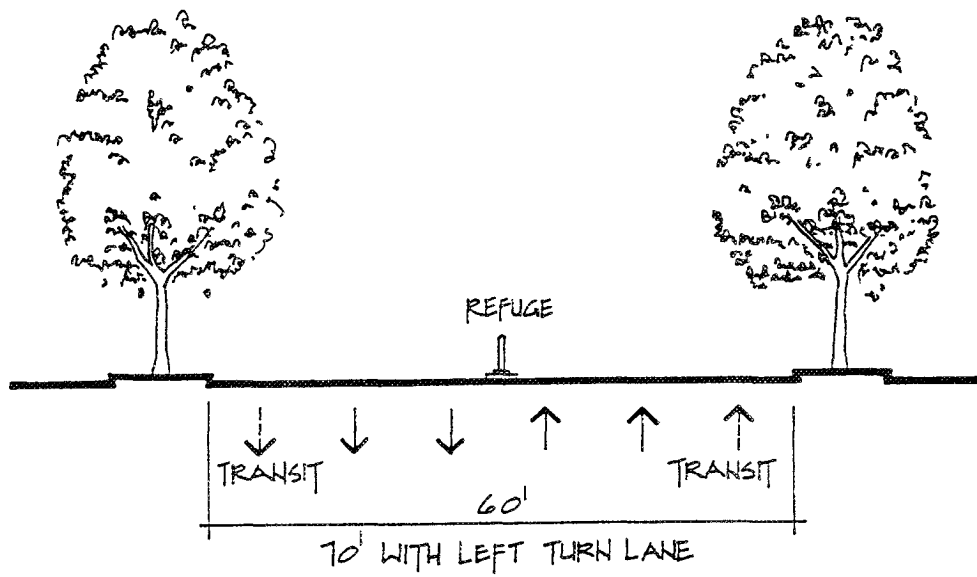
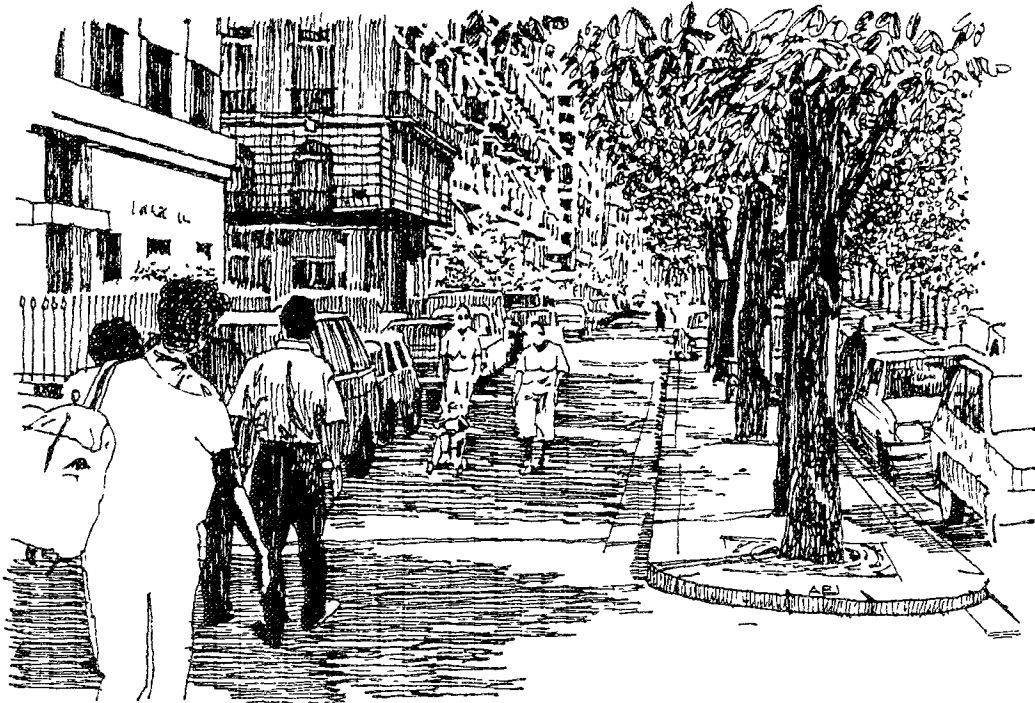


Figure 3.4.2. Center Realm with Three Traffic Lanes Each Direction

## 5. THE PEDESTRIAN REALM



*Ave Montague  
Pedestrian Realm*

### The importance of the pedestrian realm

The establishment of a pedestrian realm in all the area that extends from the edge of the right-of-way to the edge of the median along the central roadway is key to a successful and safe boulevard. This realm includes the access roadway within it. Movement in the access way is designed to be slow, and to respect the presence of pedestrians.

These extended pedestrian realms are necessary to create a balance between the use of the boulevard as a major through-going road, and for local use for residential or commercial purposes.<sup>21</sup> They provide space for parking, slow-vehicle movement, and pedestrian movement, they make crossing the street shorter and easier, they provide the city and local inhabitants with an open-space amenity, and they buffer abutting properties from the pollution, noise, and psychological impact of heavy traffic.

The pedestrian realm is established by particular physical and functional arrangements having to do with size, physical definition, and functional integrity as a local slow-moving realm. Of major importance is the location of pedestrian attractions on the median, which induces many crossing movements between the sidewalks and the medians, allowing pedestrians to claim the whole space.

It is important that the design of the pedestrian realm address all of these issues. A half-hearted attempt to create a pedestrian realm may be less safe for pedestrians than a conventional street design.

On boulevards where the pedestrian realm is violated by allowing fast and through car movement in it, pedestrian accidents along the length of the street are relatively higher than along other normally configured streets. On other streets, such as K-Street in Washington, D.C., or Shattuck Avenue in Berkeley, despite the creation of a slow-moving realm, the lack of physical definition — predominantly the absence of strong rows of trees on the median — has made the side realms less effective as pedestrian-dominated spaces, and is creating the sensation that the through-going traffic still dominates

### **Guidelines for the establishment of a pedestrian realm**

- As was previously discussed (see Section 4, Boulevard Realms and Overall Size), the combined width of the pedestrian realms on both sides should be at least 50 percent of the overall width of the right-of-way. Often, however, the pedestrian realm may be 60 to 70 percent of the overall size.
- The pedestrian realm should be defined strongly by a continuous median, planted with at least one uninterrupted, densely spaced line of trees, that marks the boundary with the central, through-traffic realm (see Section 6, Continuous Tree-Lined Median that Bounds the Realms and Section 7, Rows of Trees and Tree-Spacing). The canopy of trees, together with the buildings facing the street, creates a defined enclosed space at a pedestrian scale.
- It is very important to allow parking on the access road (see Section 9, Parking). The interference caused by cars moving in and out of parking spaces and looking for space to park helps to slow traffic on the access way, and to discourage drivers in search of speed from moving into the pedestrian realm. Furthermore, some parking seems to be necessary when buildings are facing a main street. In Barcelona, for example, on a boulevard where parking on the access ways is not permitted, drivers tend to park illegally to make deliveries and for short stops related to the businesses in the facing buildings.
- It is important to have only one lane of travel in the pedestrian realm. If two lanes of travel are allowed, faster vehicular movement in the pedestrian realm will be possible, again making it an attractive bypass opportunity for non-local traffic, destroying the slow-moving pace of the realm. This may result in increased danger for pedestrians, as the examples of the Grand Concourse and Queens Boulevard in New York suggest.<sup>22</sup> One should also be wary of over-provision of parking space, however, because an empty parking lane could be used as a moving lane.
- Access to the pedestrian realm by vehicles is best achieved at the intersections. Breaks in the median to allow car access at mid-block locations (K Street in Washington, D.C., for example), intended to eliminate conflicts at the intersections, seem in reality to create more conflict points with through traffic. They also disturb the continuity of pedestrian use of the median (see Section 6, Continuous Tree-Lined Median that Bounds the Realms).

Illustrative Diagrams:

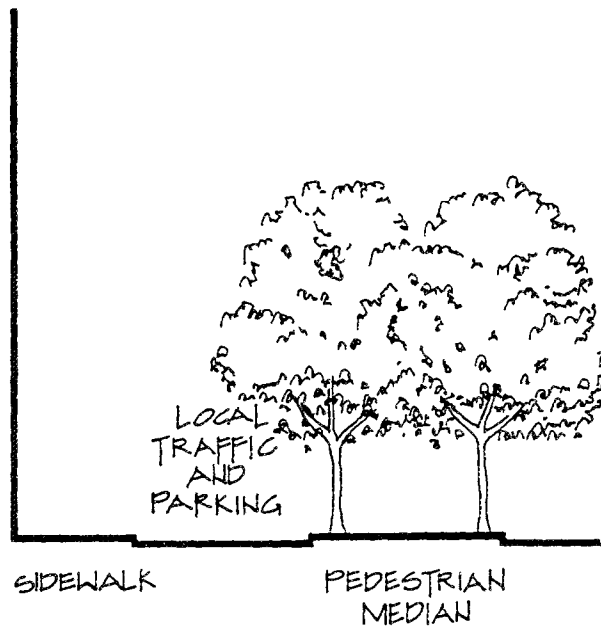


Figure 3.5.1. Elements of the Pedestrian Realm

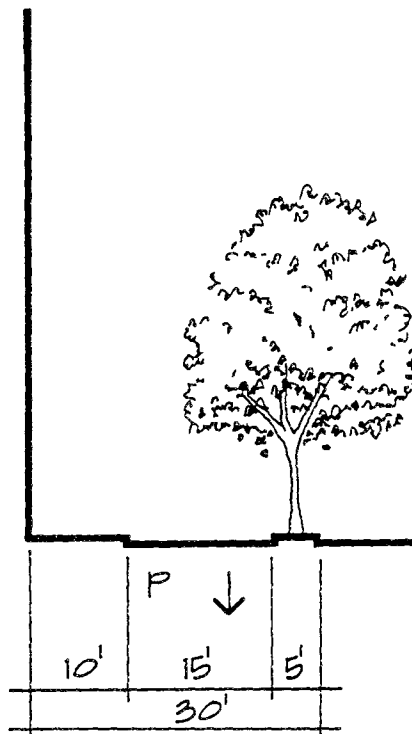


Figure 3.5.2. Hypothetical Minimum-Width Pedestrian Realm

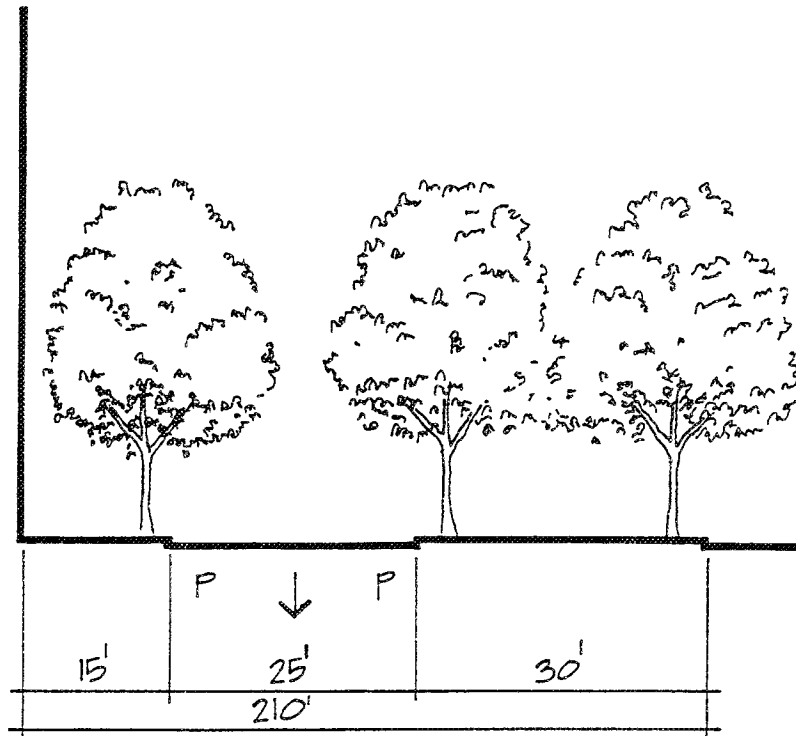
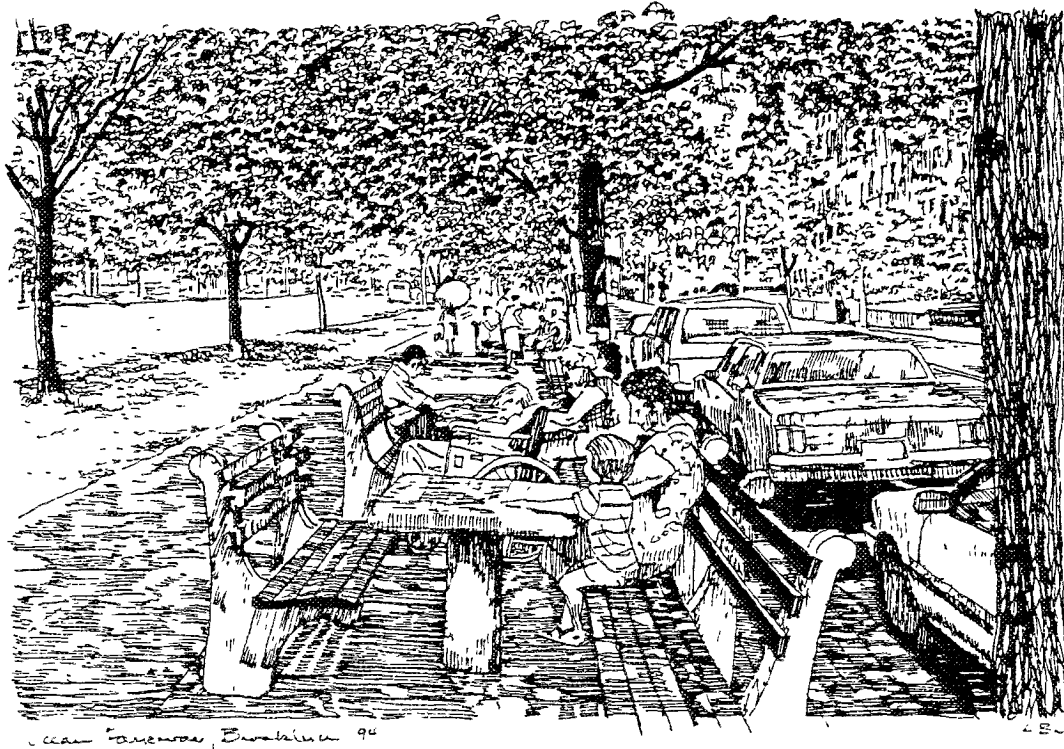


Figure 3.5.3. Ocean Parkway Pedestrian Realm

The above issues define the minimum requirements for the creation of a pedestrian realm. However, the pedestrian realm will be reinforced with further design features:

- The median can accommodate many amenities for pedestrians, such as transit stops and subway entrances, kiosks, benches, fountains, or flowers, all of which encourage many crossings between the sidewalk and the median, thereby increasing the domination of all the space by pedestrians
- Lighting scaled for pedestrians can be provided on medians and/or sidewalks. Lights should be frequently spaced (approximately 50 feet apart), low in height, and warm in color
- Sidewalks can be relatively narrow. Once people start walking in the access lane, they tend to continue walking there. When this happens, drivers respect their pace and patiently drive behind pedestrians. In limited rights-of-way, it may become necessary to make the sidewalks narrow — as little as five feet. While this dimension is usually insufficient for ordinary streets where the sidewalk is the only space reserved for pedestrian use, on boulevards it can be adequate because the access way can serve as an overflow area in places and times that pedestrian traffic is heavy (see Section 12, The distribution of pedestrian space between sidewalk and median).
- The definition and nature of the pedestrian realm can be further enhanced by a slight rise in elevation from the center realm and by a different and perhaps rougher surfacing (see Section 16, Differentiating the Roadways).

## 6. CONTINUOUS TREE-LINED MEDIANS THAT BOUND THE REALMS



### Functions of the Medians

On boulevards, continuous medians bound the center roadway and the pedestrian realms on each side, separating them and joining them together at the same time. Medians are the most flexible part in the design of a boulevard,<sup>23</sup> and their form and character determines to a great extent the form and character of the boulevard.

The primary function of the medians is to define and protect the pedestrian realm from the speed and noise of through traffic on the center roadway. The medians create a more tranquil and slow-paced realm between them and the buildings facing the street.

Another function is to shield the through traffic from the interference of parking and access uses. Observation suggests that driving in the center realm of a boulevard is smoother and involves fewer swerving motions in and out of lanes to negotiate traffic than on ordinary streets.

The medians also create a space where interfacing and passage from one realm to the other can take place. They can contain bus stops and access to subway stations, or can shield, momentarily, cars trying to move from one realm to the other while they wait for an opportunity to merge into traffic (Figure 3.6.1).

A boulevard, and indeed any arterial street, is a formidable barrier to crossing movements. By breaking down the scale of the street, crossing movements may proceed in two or even three stages to



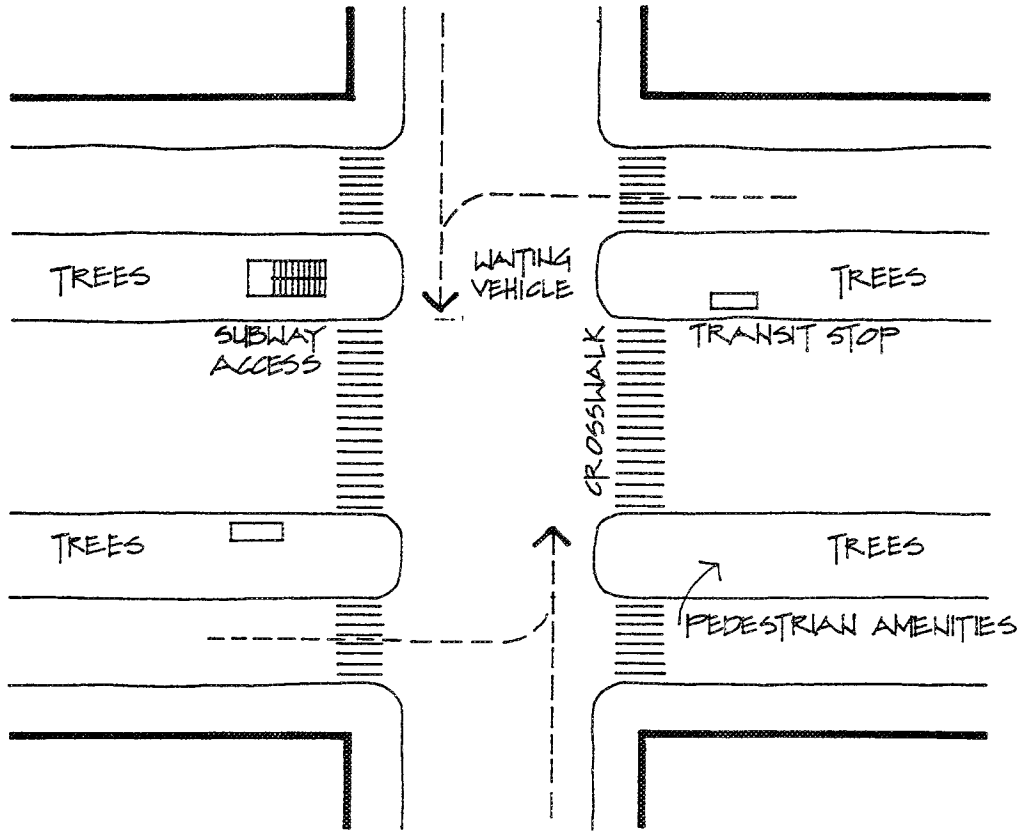


Figure 3.6.1. The Various Median Functions

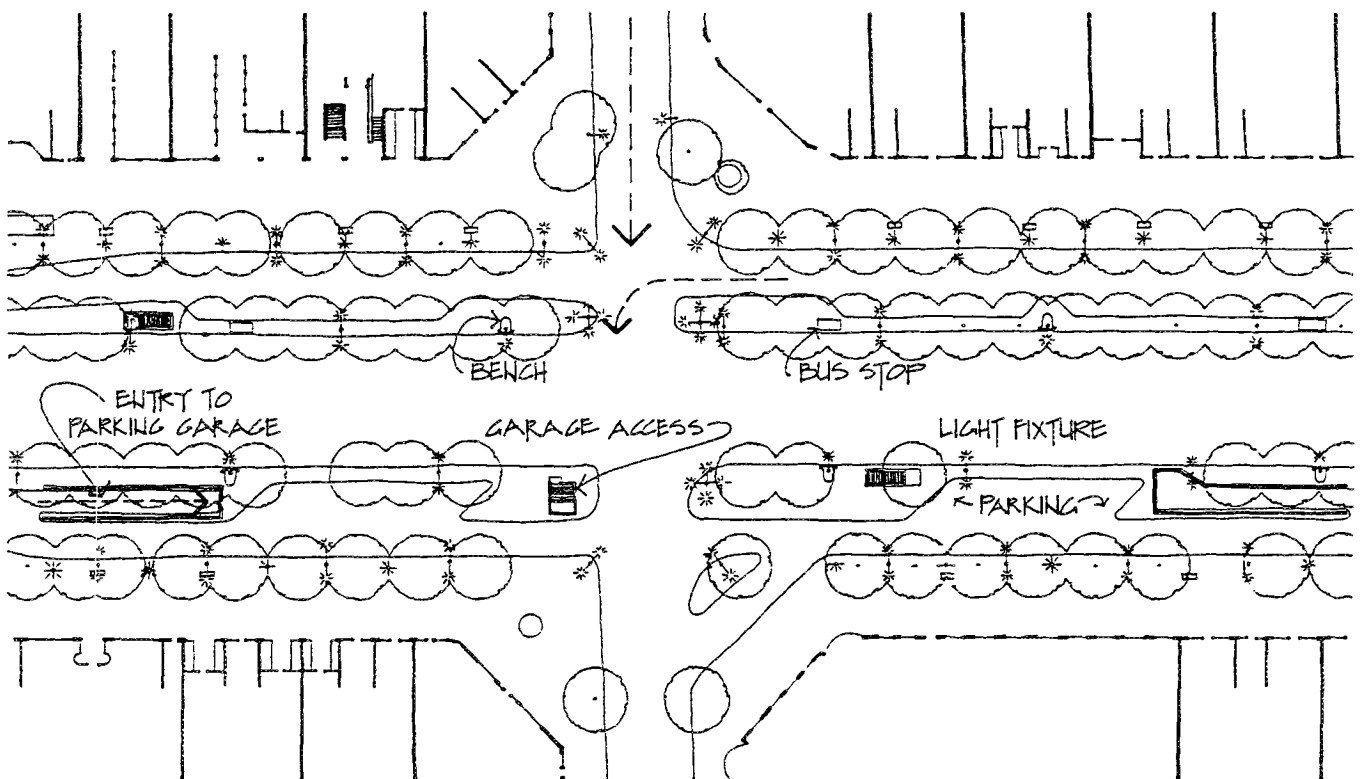
the edge of the median, across the center realm, and across the second pedestrian realm. Waiting pedestrians and cars can use the median as a shield from traffic. Almost universally, pedestrians cross from the sidewalk to the median without regard to the light, if the access road is free, which is often, and then they wait to cross the center roadway with the light. This is particularly helpful for older people.

#### Guidelines for the design of a continuous median

- The median is the most flexible element in the design of a boulevard. Depending on the width of the boulevard, the median can be a minimum of 5 feet or up to a maximum of perhaps 40 feet to 50 feet. As an absolute minimum, it must be wide enough to accommodate a line of closely spaced fairly large trees. The width of the medians depend to a large extent on the width of the overall right-of-way. In narrow rights-of-way, the median will tend to be minimal (6-8 feet); in wider ones, it can be more generous.
- The most important element in the median, its defining characteristic, is the line of trees: one or two rows of trees, closely spaced, uninterrupted and reaching all the way to the intersection (see Section 7, Rows of Trees and Tree-Spacing).

- The second element that is almost universal on good boulevards is the location of bus or streetcar stops on the median, where necessary. If stair access to subways is needed, it should also be available on the medians.
- The third element that is often found on medians of good boulevards are regularly spaced and frequent benches.
- The fourth element is pedestrian-scaled street lights, at intervals of approximately 50 feet.
- Various other elements can enliven a median and make it more useful: kiosks and vendors, pedestrian-scaled billboards, or city maps. In some places, where the median is wide enough, and actively used, water fountains, public toilets, and planted flowers can also add to its usefulness.
- The medians may be paved or not, and the trees set in a continuous unpaved planting strip, or in tree wells, in response to expected intensity and type of use. Wider medians, if they are designed to be used as a promenade, are usually partly paved.

### Illustrative Diagrams:



**Figure 3.6.2. Paseo de Gracia Plan**

This existing boulevard illustrates the many uses of the medians.

## 7. ROWS OF TREES AND TREE-SPACING



### The Importance of Trees

Trees are indispensable in boulevard design. They are perhaps the defining characteristic of all boulevards and fulfill three functions.

Their first role is to give definition to the three realms of the boulevard. They mark the boundaries between the center, fast-moving-vehicle realm and the slower pedestrian realms on either side. They also break down the scale of what is otherwise a very wide road. Consistently, observers underestimate the width of boulevards with strong rows of trees, and overestimate the width of arterial streets that do not have rows of trees in them.

Trees create a pleasant environment for pedestrians and drivers alike, a realm that is shaded in summer and free of glare and sharp contrast. Research has shown that they do not have a detrimental effect on the safety of streets, while they help the well-being of all street users.

Finally, the lines of trees become a clear urban element that helps people orient themselves in the city as a whole. The boulevard becomes a memorable street that helps people in finding their way around in the city.<sup>24</sup>

Trees are an investment, and they need maintenance. In Paris, trees are constantly replanted to maintain the close spacing of 15 to 25 feet that is typical of Parisian boulevards. Severely pruned trees on

the Paseo de Gracia in Barcelona left the street bereft of the dense tree canopy that was one of its major assets. Old pictures of K-Street in Washington, D.C., show a remarkably better street, before most of its trees were cut down sometimes in the late fifties. The same is probably true of Grand Concourse in the Bronx.

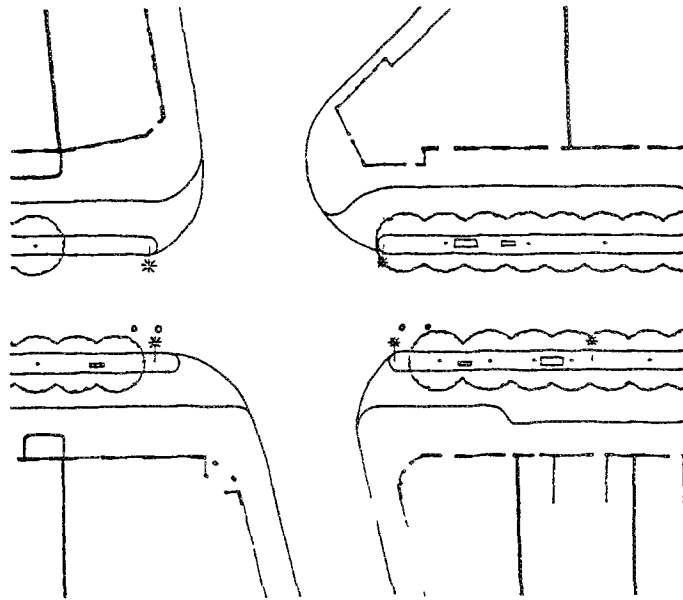
It is impossible to create the pedestrian realm solely with a median and lane divisions, and without trees. On Shattuck Avenue in Berkeley, California, and K-Street in Washington, D.C., the pedestrian realm fails to materialize because of the lack of consistent and dense rows of trees in the medians. In another example, the Diagonal in Barcelona, the pedestrian realm exists, despite the fact that the access road is given to through traffic, solely because of wide and densely planted medians that mitigate the heavy traffic (an ADT of over 100,000 vehicles).

### Guidelines for the design of rows of trees

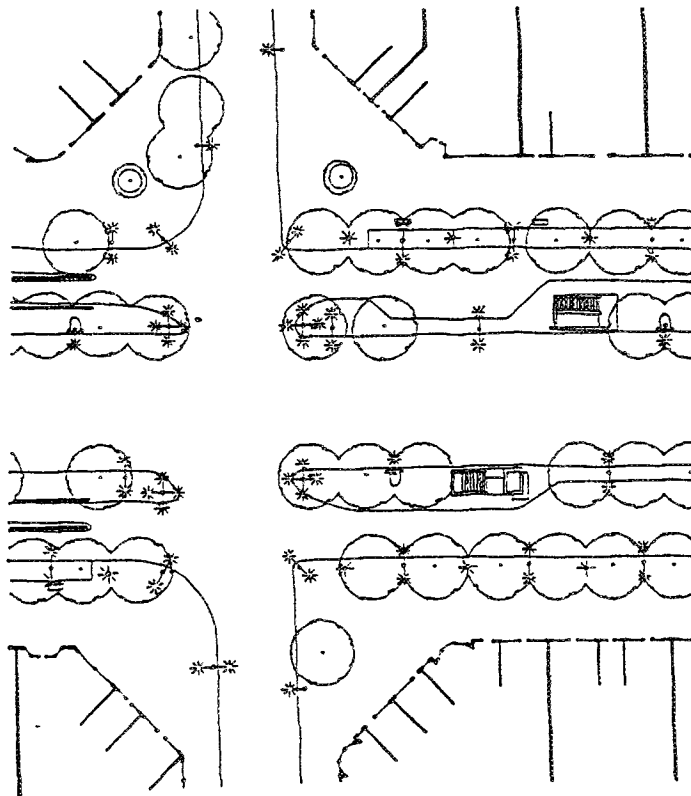
- It is important that the trees are closely spaced and that they continue all the way to the intersection, with a maximum spacing of 35 feet. A minimum spacing as low as 12 feet is possible depending on the tree species. With London Plane trees a spacing of between 15 to 25 feet is often used with good results. Spacing should be such that tree canopies connect to form a continuous canopy along the median and overhanging the access road.
- Trees do not have to be of one species. An alternating pattern of two or three species can work, as on the Diagonal where shade trees alternate with tall palms.
- Deciduous trees are generally preferable. They provide shade in the summer yet allow sun into the street in winter. In warm climates their shade giving function is paramount.
- In order to have a visual connection across the street, and to maintain the integrity of the street as one whole, trees with dense foliage below eye level should not be used.
- Arrangement of trees.
  - ◆ In medians 5 to 10 feet wide trees are best planted in the center of the median, to allow enough growing space.
  - ◆ In medians 10 to 20 feet wide with only one row of trees, the row of trees is better placed at the outer edge of the median closer to the center roadway. In that way most of the median's width is included in the pedestrian realm. It is also possible to plant two rows of trees in a staggered pattern.
  - ◆ On medians wider than 20 feet, it is possible to plant two or even three rows of trees. While freer arrangements are possible with the interior rows of trees, it is very important that the defining line of trees at the edge of the pedestrian realm remains constant and clear. Experience suggests that a simple rhythmic planting arrangement is more effective than complex ones to achieve an atmosphere of grace and pleasantness that is characteristic of the best boulevards.

**Illustrative Diagrams:**

Various tree planting arrangements are best illustrated with existing examples.



**Figure 3.7.1. Tree Planting on the Avenue Montaigne, Paris**



**Figure 3.7.2. Tree Planting on the Paseo de Gracia, Barcelona**

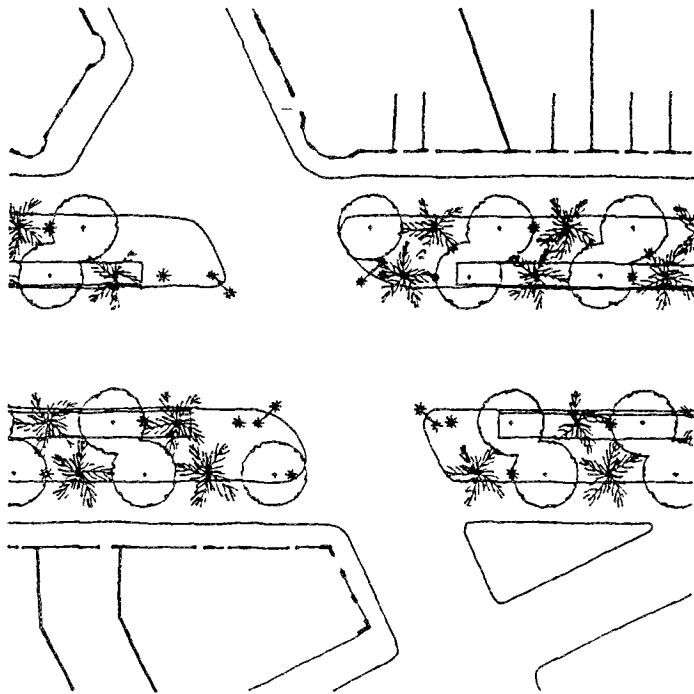


Figure 3.7.3. Tree Planting on the Diagonal, Barcelona

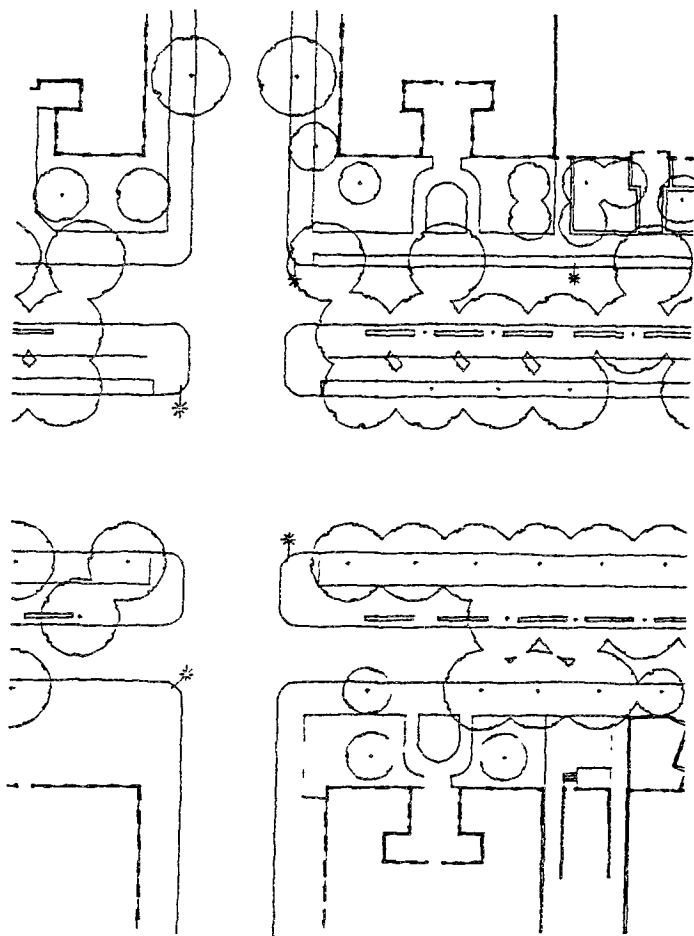


Figure 3.7.4. Tree Planting on Ocean Parkway, Brooklyn

## 8. PUBLIC TRANSPORT



As major trafficways in cities, boulevards are a natural location for public transportation. Public transportation benefits boulevards by adding to the pedestrian use of the street, and facilitating the connection between the local area and the city as a whole.

If subway or light-rail exist, or are contemplated, they can be accommodated within a boulevard's right-of-way width with relative ease. High volumes can be achieved by dedicated transit lanes and incorporating articulated buses traveling along trunk routes. Special designs that facilitate quick embarkation can also be placed in the extra space afforded by the medians.

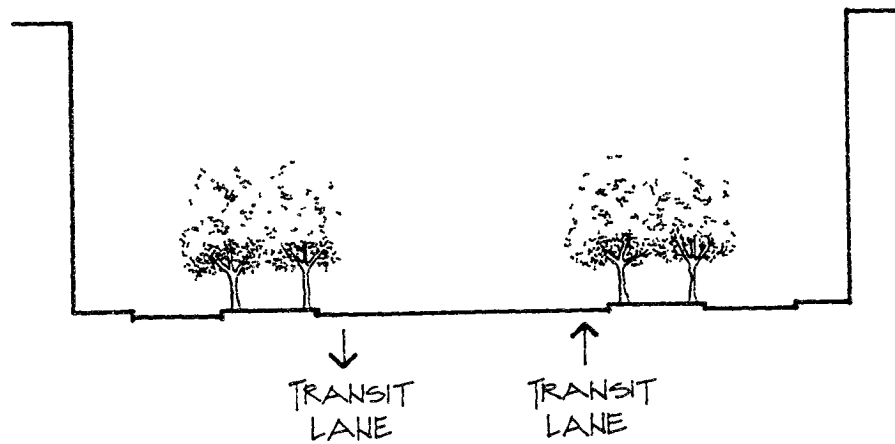
Public transportation systems not only need relatively wide rights-of-way, but also need easy connections for pedestrians. Public transit creates frequent street crossings near stops. Recently, the land use potential of such public transportation corridors has also come into focus<sup>25</sup> For these reasons, it seems that boulevards are an extremely appropriate location for public transportation improvements<sup>26</sup>

### Guidelines for the incorporation of Public Transport in the boulevard

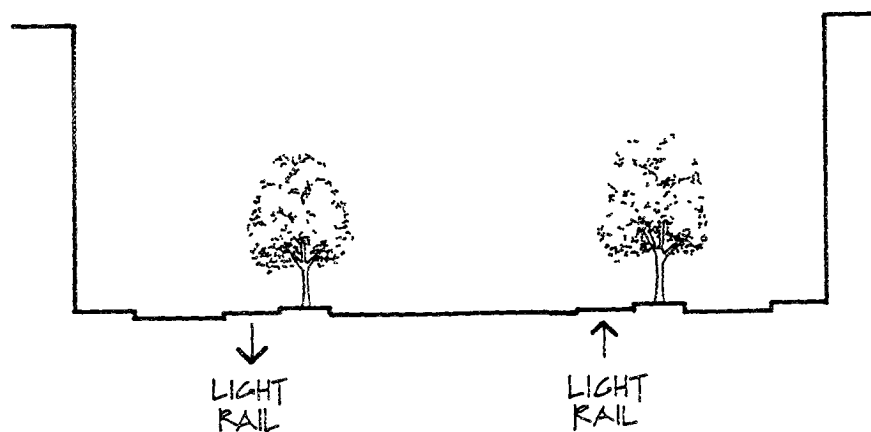
- In boulevards with three or more lanes in each direction, where public transport is necessary and highly used, the lane next to the median should be considered as a dedicated public transport lane

- If light-rail is incorporated into the street, it could run in the curb lane of the center roadway, or, if there is a desire to separate it from the cars, on the median (as shown in the Geary Boulevard case study designs).
- Locating stops on the medians will encourage pedestrian use of the median, and will encourage other useful amenities on it.
- Where a subway system exists or is contemplated, it is desirable to place entrances on the medians

**Illustrative Diagrams:**



**Figure 3.8.1. Suggested Transit Location**



**Figure 3.8.2. Alternate Light-Rail Location**



## 9. PARKING



### Parking on access roads is essential to establish the pedestrian realm

Existing street standards and guidelines discourage parking along major streets<sup>27</sup> However, some parking is important on boulevards for the following reasons

- Parking slows traffic on the access streets, because of cars pulling in and out and drivers slowing down to look for parking space.
- Street-based parking increases pedestrian movement along the street. People rarely find a place to park directly across from their destination, and must therefore walk along the street.
- Parked vehicles act as a physical barrier between pedestrians and moving cars (even slow-moving cars) and thus provide a sense of safety
- Parking along the access road increases direct access between the street and land uses facing it. It makes small businesses more viable because they have visibility along the street, and have less of a parking requirement to meet and pay for. It encourages street-based commercial development.

- Parking creates an interface on the street between cars and pedestrians that enlivens street activity. Deliveries from parked trucks, or people lingering to talk before one of them drives off, are normal everyday scenes observed again and again on good boulevards.

However important parking may be, it should not be allowed to dominate the pedestrian realm, but should be balanced with other pedestrian uses. In Paris, for example, a third lane of parking was added to some boulevards by using the curb lane of the center roadway. Besides negating the benefits of an unhindered central roadway, this extra lane of parking creates a parking lot feel, diminishing the pedestrian nature of the access way and median.

### Guidelines for parking

- The access way can include one or two rows of parallel parking, depending on available space.
- Parking lanes should be narrow. A lane width of 6 or 7 feet is possible and sufficient; 8 or 9 feet is the maximum. Greater widths make the passing lane feel too wide and encourage speeding.
- If a wide median is being designed, and there is demand, an angled parking lane can be incorporated into the median.
- Where an access way has two parking lanes, it may be helpful for pedestrians if the median is widened at intersections at the expense of one of the lanes. This necking will make it easier for pedestrians to cross to the median, and will also slow cars entering the access way.
- If more parking is needed, it can be provided by lineal underground parking garages beneath the central roadway, with entry and egress for cars from the access road, and from the medians for pedestrians.

### Illustrative Diagrams:

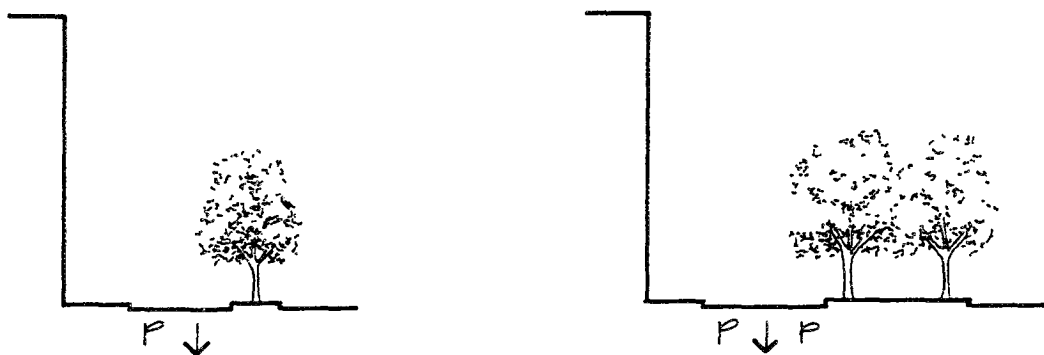


Figure 3.9.1. One or Two Lanes of Parallel Parking

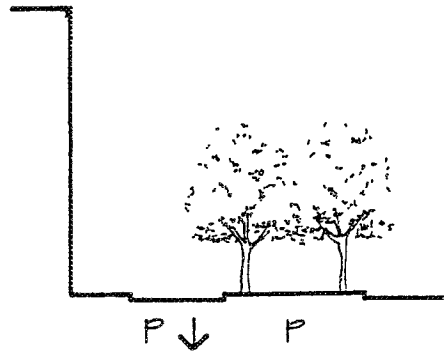


Figure 3.9.2. Angled Parking Incorporated in the Median

## 10. LANE WIDTHS

The ability to implement boulevards in limited space (between 100 feet and 140 feet) depends on the acceptability of narrower lanes (7 to 9 feet in the access way, and 9 to 11 feet in the center roadway). Previous research<sup>28</sup> shows that this can be done without making the boulevard less safe — perhaps even increasing pedestrian safety — by making crossing easier, and by slowing cars on the access ways.

Further, it was shown that it is more difficult to achieve the definition of the pedestrian realm when lanes are wider (12 feet and 13 feet) in the access way.

It is therefore important to specify a maximum as well as minimum widths in the guidelines.

There remains the problem of access for emergency vehicles, particularly fire trucks. This issue is raised particularly in relation to narrow access lanes, but the problem is less acute than it seems. The width of most access ways is not less than many normal residential streets, into which fire trucks enter. Also, fire trucks can operate from the center roadway, particularly when the access way is narrow, without overly increasing distances to the buildings.

The access road and the center roadway should be governed by different criteria. The access road is similar to a local street in nature, and it should be designed with constricted lanes to induce traffic to be slow, rather than to encourage speed. In the center roadway it is appropriate for lanes to be wider, but not excessively so, because of the need for pedestrians to be able to cross the street, and to discourage speeding.

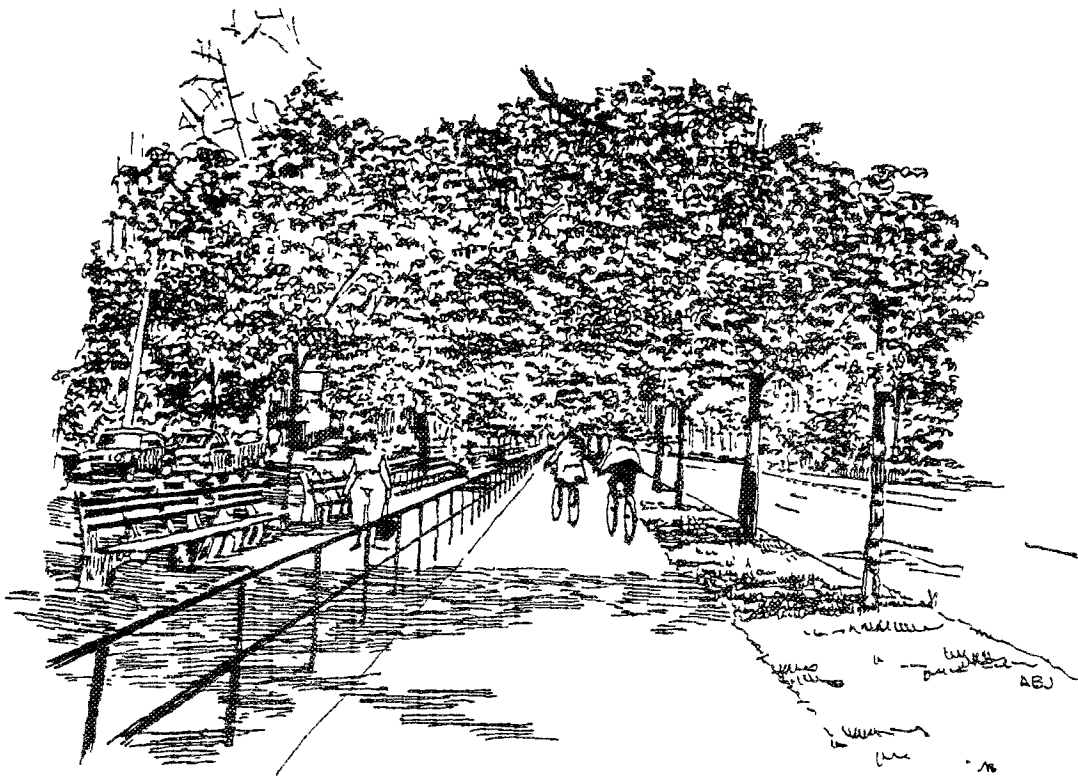
### Guidelines for lane width

- Recommendations are summarized in the following table.

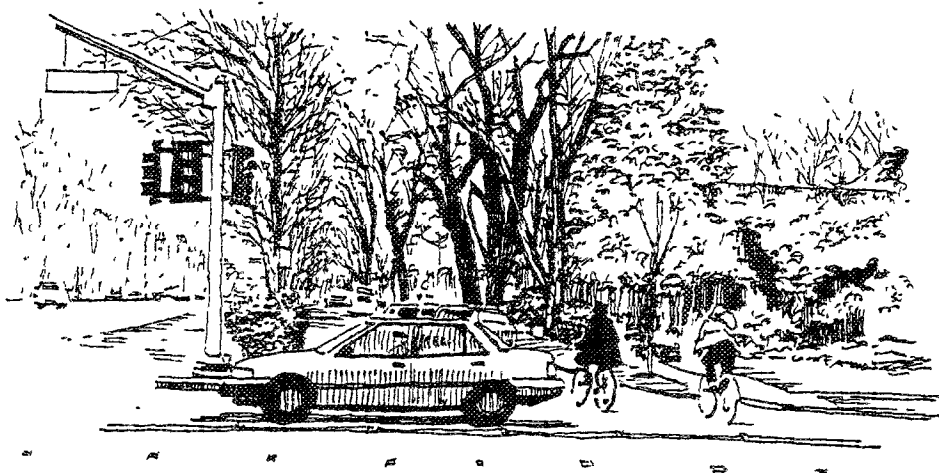
	Access Roadway		Center Throughway		
	min.	max.	min.	max.	
Parking lane	6'	9'	Curb Lane	9'	13'
Inside lane	7'	11'	Inside Lane	8'	12'
			Left-Turn Lane	8'	12'

Figure 3.10.1. Table of Lane Width Recommendations

# 11. BICYCLE LANES



Ocean Parkway - Bicycle Path



Chino, Calif Esplanade

## Boulevards easily accommodate bicycle movement

There is a growing movement to create separate rights-of-way for bicycles. This movement is fueled by two considerations—a recognition that cyclists are endangered by cars when they share street space with them, and that bicycles present a danger to pedestrians when they share a path with them.

Two types of bicycling need to be distinguished. There is bicycling for local movement, either by adults or kids. This movement is tied to the local area, for errands, for play and leisure, or for visiting local locations. It is generally slow in speed and travel distances are short. The second movement is bicycling for commuting or as a sport activity. It is relatively faster movement, and travel distances may be long.

The two types of movement have different characteristics, and may be accommodated in different ways on boulevards.

## Guidelines for accommodating bicycles on boulevards

- Local bicycle traffic can easily be incorporated on the access lane within the pedestrian realm. Moreover, observation teaches that cyclists will use the realm very much like pedestrians, with disregard to the direction of the movement, and that they do so with perfect safety.
- Designated bicycle lanes for faster-moving commuter bicycles can be incorporated into a wide median on a designated path, or as the first lane in the center roadway next to the median. Essentially it should be viewed as a part of the through-going central realm.

### Illustrative Diagram:

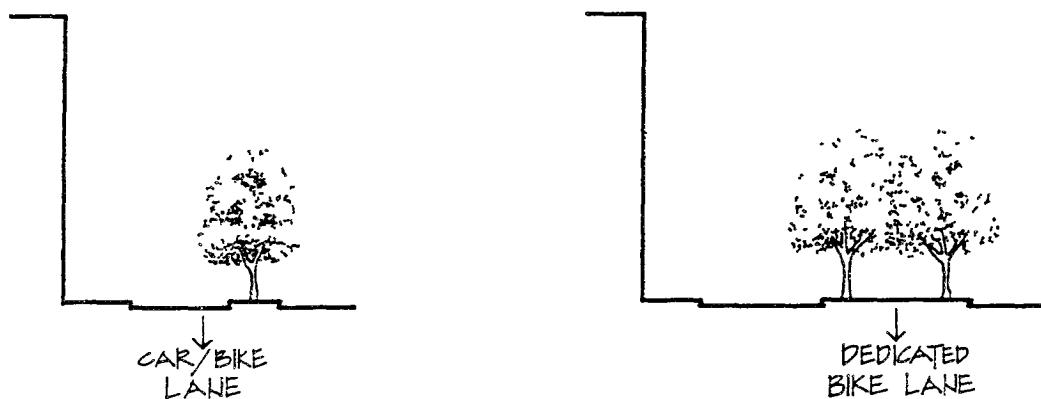
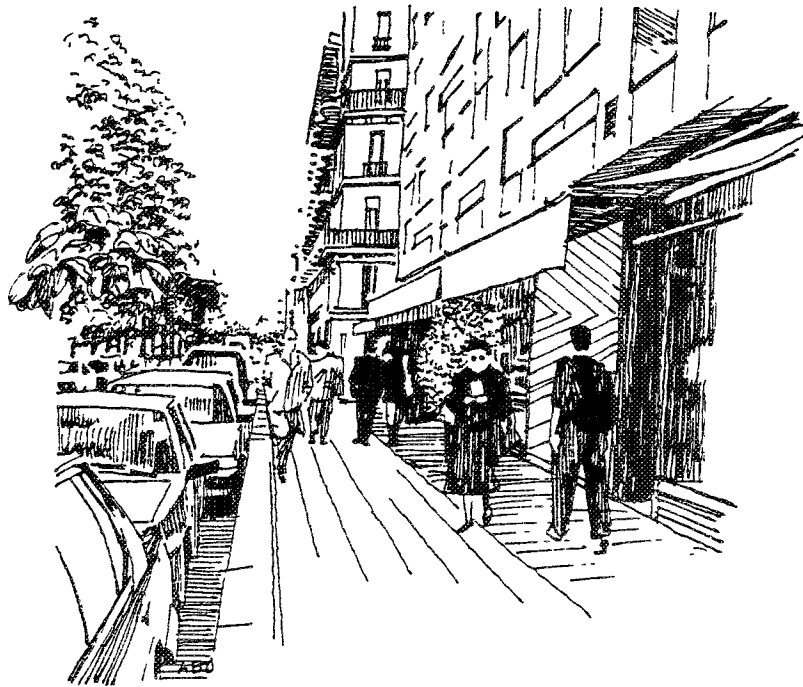


Figure 3.11.1. Shared or Dedicated Bicycle Pathways

## 12. THE DISTRIBUTION OF PEDESTRIAN SPACE BETWEEN SIDEWALK AND MEDIAN



*Avenue Montaigne  
10 ft sidewalk.*

### The best boulevards are energized by a certain tightness of conditions

On boulevards built in narrow rights-of-way, tightness occurs of necessity. Boulevards cannot be built in rights-of-way of 100 feet to 140 feet without sidewalks, traffic lanes, and medians being minimal. This is not necessarily a problem. Observation reveals that it may even be helpful that pedestrians claim the whole of the pedestrian realm as their territory, causing cars to drive at walking pace. As the sidewalk becomes congested with people, those wishing to walk faster feel comfortable walking in the access way. Once on the access way, people tend to stay there and walk along it. This also happens when a sidewalk is constricted by café seating, a street vendor, or an occasional front garden or stoop. Other people coming into the boulevard, seeing the access way used in that way, follow the example. Often the access way becomes shared space, with cars moving slowly behind pedestrians.

On wider boulevards, one is faced with a choice: should the extra space in the pedestrian realm be used to make the sidewalk wider, or should it be used to make the median a more substantial pedestrian promenade?

The two spaces are different in their intent and function. The sidewalk is geared predominantly for visual and physical access to abutting buildings as well as for strolling; it invites function and purposeful movement. The median is more of an amenity in nature; it invites strolling movement or lingering

Therefore, adding more space produces different results in sidewalk and median. Wider sidewalks may be counter-productive.<sup>29</sup> Unless they are full of people, they may look desolate and uninviting. The medians, on the other hand, benefit from the extra space, because it increases their attractiveness as a park-like amenity, for seating and strolling.

In cities where utility lines run beneath sidewalks, narrow sidewalks may be perceived as a problem. In fact, the boulevard configuration allows expanded area for underground utility lines, because the entire width of the pedestrian realm can be used for them, without hindering through traffic when repairs are necessary.

### Guidelines for distribution of pedestrian space

- It is better that sidewalks are slightly congested with pedestrian traffic than that they appear empty and desolate. If they do become congested with pedestrians, there is always an overspill area in the access way and the median, where people can walk faster.
- If dimensions of the right-of-way are wide enough to have either a wide median or a generous sidewalk, consider making the sidewalk narrow, and the median wide, making it function more as a linear park, while keeping the sidewalks alive with many people.
- A closely spaced line of trees on the sidewalk can reinforce the difference between the center and the sides by creating a canopy enclosure above the access roadway.

### Illustrative Diagrams:

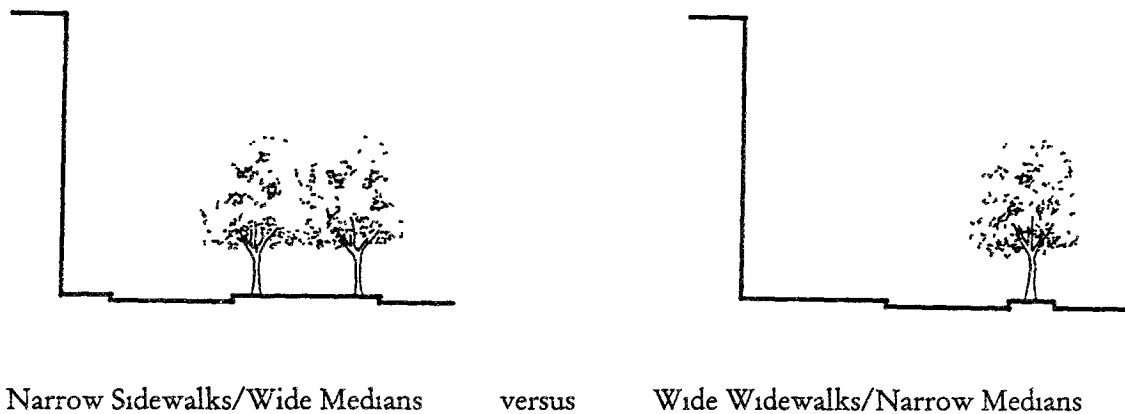


Figure 3.12.1. Distribution of Pedestrian Space in Wide Right-of-Ways





Figure 3.12.2. Tree Canopy Enclosure Over Access Roadway

### 13. INTERSECTION DESIGN

When intersections are complex and there are many choices of movement, drivers act with caution<sup>30</sup>

Well-designed boulevard intersections do not attempt to predetermine all of the movements that will be attempted by drivers and pedestrians, nor do they attempt to separate all the possible movements from each other. Boulevard intersections are designed to help people negotiate conflicts in consonance with an easily understood set of priorities. Because they understand that boulevard intersections are complex, most drivers approach them with caution, particularly when going in or out of the main traffic flow on the center roadway (Figure 3.13.1)

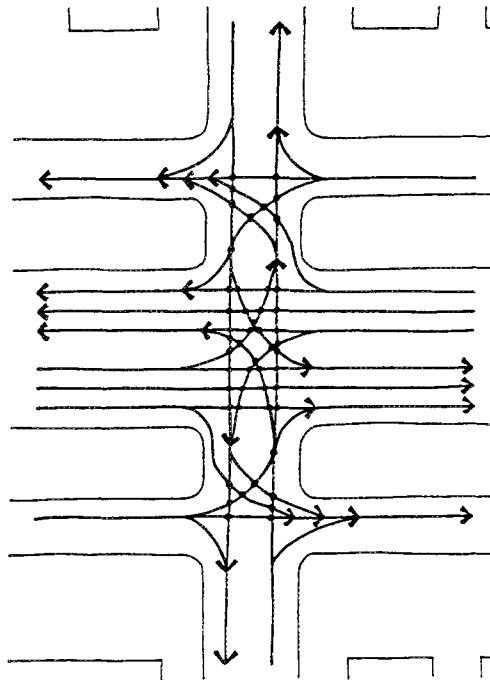


Figure 3.13.1. Potential Conflict Points at Boulevard Intersections

Boulevard Intersections should also be designed with pedestrian safety in mind.

## Principles of Intersection Design

The following are some guiding concepts for the design of boulevard intersections:

- 1 All turning and weaving movements can be allowed on boulevard intersections unless there is a compelling reason to do otherwise.
- 2 Priority is given first to center through traffic, then to crossing traffic, then to movement on the access road.
- 3 Turning radii and the configuration of medians are determined primarily to allow pedestrians easier crossing of intersections. Ease of turning for cars and large vehicles are secondary considerations.

## Guidelines for intersection design

Many different physical configurations are possible for boulevard intersections, depending on the width of the medians, and the character of the street. Different control arrangements are also possible, and discussed in the next section.

- The most straightforward intersection arrangement is straight medians that extend more or less as far into the intersection as the edge of the sidewalk. Crosswalks across the boulevard width are then interrupted by the medians, reinforcing their roles.

This arrangement is appropriate for both wide or narrow medians. Parking lanes along the access roadway may be stopped near intersections to achieve either wider sidewalks or wider medians at these points, making it easier to cross the access ways.

- Access roads may be designed to return to the central roadway immediately before and after intersections. This design exists in Shattuck Avenue in Berkeley and Boulevard Courcelles in Paris. An advantage of this design is that intersections are simplified, as there is only one roadway crossing the intersecting street. However, when traffic in the center is heavy, merges into the center are difficult and left turns from the access roads may not be possible. This configuration is much less desirable with medians over ten feet wide because the "return" passage becomes substantial, interrupting the median excessively.
- Medians may be held back somewhat from intersections, with the median and sidewalk connected by a slightly raised and arcing curb. This design is used on some Paris boulevards. This design increases the sense of difference between the pedestrian realm and the center roadway, and the slight rise, which could be used on other designs as well, gives the access road an aura of separateness. The arc of the edge of the access way and the slight setting-back of the medians from the intersection makes it easier for cars turning right from the center and signifies their intention to drivers on the access way. It is also easier for drivers coming out of the access way to go in any direction. On the other hand, the set-back medians provide less of a shelter for crossing pedestrians.

Illustrative Diagrams:

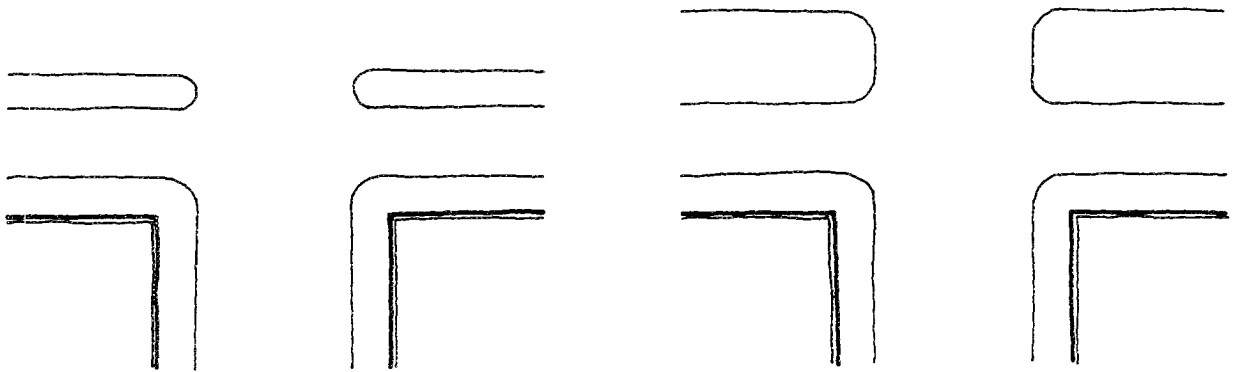


Figure 3.13.2. Intersections with Straight Medians

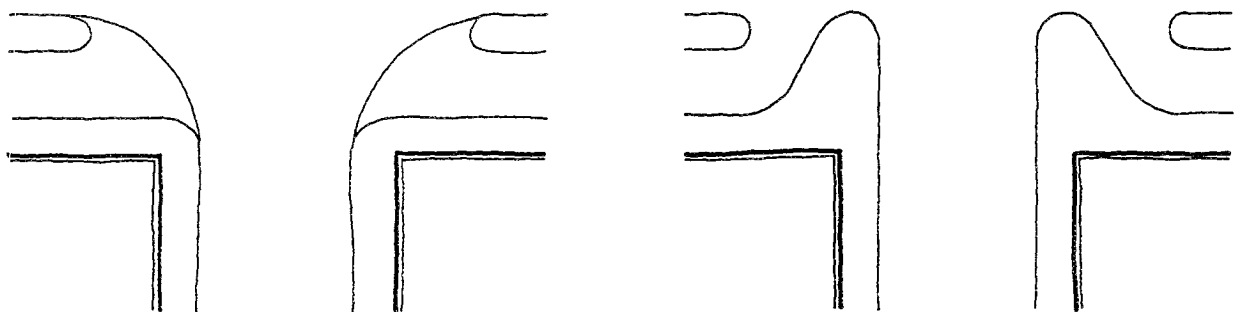
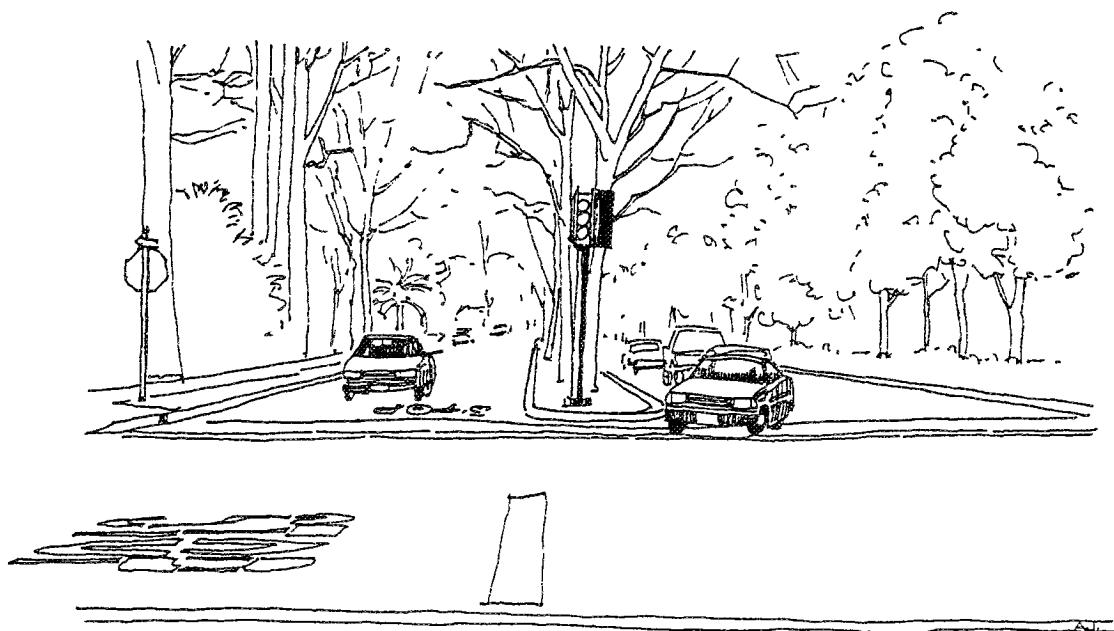


Figure 3.13.3. Intersections with Raised Curbs or Access Road Return

## 14. TRAFFIC CONTROLS



### Traffic controls should reinforce the priorities of traffic

Generally, people follow the rules and pay attention to traffic controls. They usually stop at stop signs and red lights, and avoid prohibited maneuvers. There are, however, consistent patterns of disregard of traffic controls, where people perceive that their action is safe, and where transgressing helps them to move more quickly, directly, and with more safety towards their destination. Consistently, if a particular action is perceived to be safe, even if it is prohibited, the pedestrian or driver takes it, using more caution and perhaps making sure that no police are in sight.

The most common disregard for traffic controls observed on boulevards is the behavior of pedestrians who regularly cross from the sidewalk to the median against a light. In a well-designed boulevard, where the traffic on the access way is slow and infrequent, this behavior makes sense. Pedestrians are shortening the width of the street they will have to cross during the green light by about half. A sensible traffic control on boulevards is to target the pedestrian crossing light only to the crossing of the center roadway, and to place a stop sign for cars in the access way at every intersection, to further enhance pedestrian safety.

For drivers too, traffic controls on boulevards should enhance their ability to achieve multiple and different aims, acknowledging that conflicts do arise, but giving a framework for resolving them quickly and safely. Drivers need to travel relatively fast on center roadways, turn easily into cross-streets when they locate them, and move into the access lane when they see their destination on the boulevard. Drivers from cross-streets may wish to enter the access way or the central roadway in either

direction, or simply cross the boulevard without conflict. Drivers on access ways may want to rejoin traffic on the center roadway in the same direction or in the opposing one, enter the cross-street in either direction, or continue to drive on the access way for another block. All of these movements can be safely accommodated with the help of traffic controls.

## Guidelines

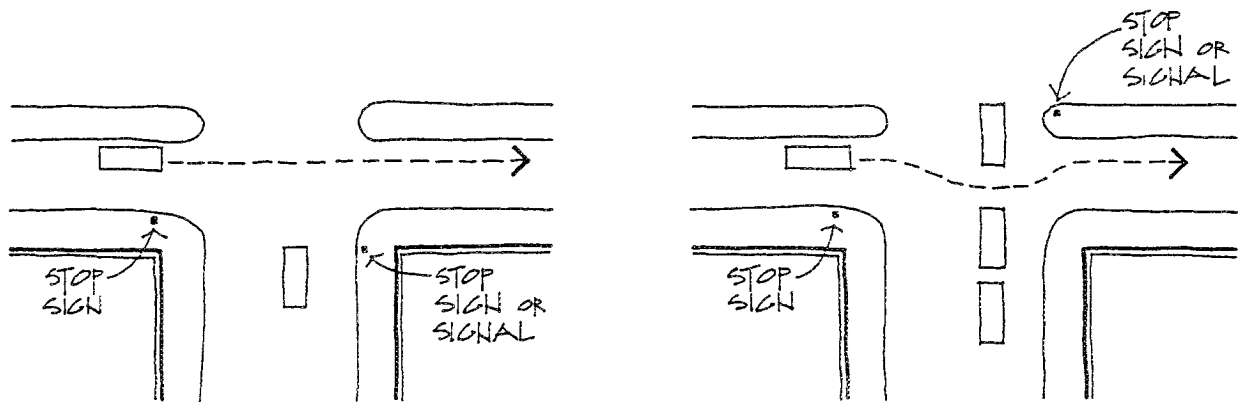
- As a rule, through traffic on the center roadway is given first priority. Traffic on crossing streets is second, and traffic on the access ways is lowest in priority. At intersections, through traffic is either uncontrolled or controlled with a traffic light to facilitate movement. On some boulevards, every second intersection is signalized. At unsignalized intersections, both the cross-street and access way will be controlled by stop signs, so that while traffic coming from the center roadway can proceed without stopping, traffic on the cross-street and access ways have to make sure the route is clear before proceeding. At signalized intersections, only the center roadway and cross-street are controlled by signals, and the access is controlled by a stop sign.

This general rule can be applied differently in different situations, most of which relate to where stop signs are located and the width of the medians:

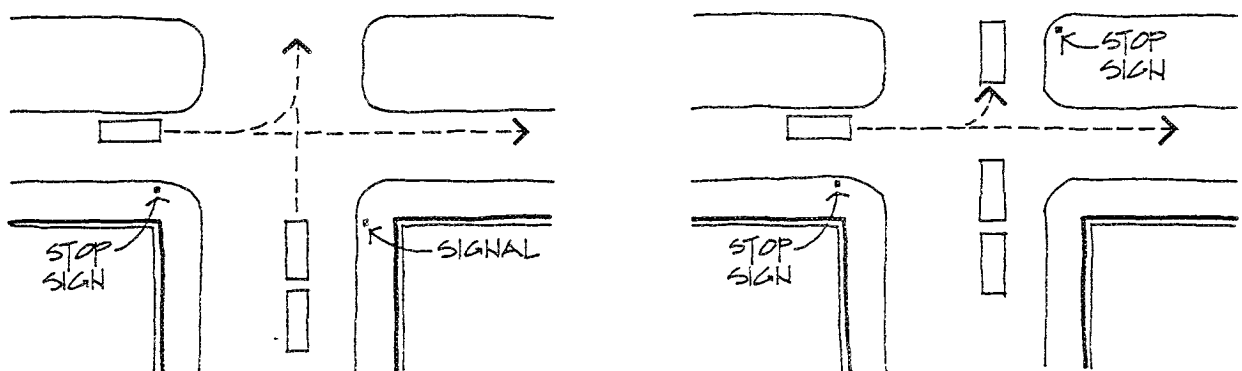
- On boulevards with narrow medians, the stop sign or signal controlling the cross-street may be located at the sidewalk or at the median. When the control is at the sidewalk, the access way remains clear of waiting cars. When the control is at the median, the access way may be partially blocked by waiting cars. However, observation informs us that the access way usually remains passable because drivers on the cross-street leave a gap in the roadway, or will go out of their way to back up, leaving room for a car to pass.
- On wide median boulevards, at signalized intersections, the cross-street signal is usually placed at the sidewalk edge. Access road drivers wishing to enter or cross the center can then move into a waiting position in the protected space provided by the wide median. At intersections where the cross-street traffic is controlled by a stop sign, it is placed at the outer edge of the median, which increases visibility for drivers waiting to enter or cross the center. Sight lines are not blocked by the wide median, as they might be if traffic is held at the sidewalk. Access road drivers under these controls must make two stops, along the access road and then at the median. This arrangement emphasizes the change in roadway function between side and center.
- Placing the stop sign, or traffic light, at the sidewalk edge on wide median boulevards allows for generous pedestrian crossways in line with the medians, thereby emphasizing the continuity of the median, and encouraging people to walk or cycle along the medians for some distance. This may be most appropriate where medians are intended to serve as promenades or if they contain a bike lane. It must be remembered, however, that merging or crossing cars will at times be waiting in the crosswalk.

- It is observed that where access roads are controlled by signals with the same timing as the central roadway, the arrangement may run counter to the intended function of the access roads, diluting their intended nature as slow, local streets.
- If cross-streets are one-way, the control situation is greatly simplified. Left turns from the access way and right turns from the center roadway are not possible in one direction. Left-turning vehicles from the access way, and right-turning vehicles from the central roadway, can easily merge into the one-way stream of crossing traffic.

**Illustrative Diagrams:**



**Figure 3.14.1. Narrow Median Traffic Controls**



**Figure 3.14.2. Wide Median Traffic Controls**

## 15. BENCHES AND PLANTERS ON THE MEDIAN DISCOURAGE MID-BLOCK CROSSINGS

### Measures to discourage jaywalking are necessary on boulevards with long blocks

On some boulevards, long blocks or the existence of many businesses on both sides of the street can create a situation where jaywalking is frequent and becomes a safety problem. The reason why people jaywalk, despite the danger involved, is that on signalized streets, particularly if traffic is not very heavy, traffic flows with a certain rhythm, leaving the street empty of cars for short periods — and pedestrians may feel that it is safe to cross.

High fences are often erected in the center of the street to discourage this behavior. These are disruptive visually, create a sense of separation between one side of the street and the other, and are often disregarded or vandalized by people still intent on crossing.

It is possible to discourage jaywalking without defacing the street and instead adding to its livability and usefulness. Continuous benches or dense planting along the median can form a barrier to jaywalking and at the same time enhance the protection of the pedestrian realm from the central roadway.

### Guidelines

- Run benches or planters without interruption between intersections on the side of the median closer to the central roadway.
- Plants must be tall enough and dense enough to discourage walking through them.
- When raised planting beds are used, their walls can double as seating spaces.

### Illustrative Diagram:

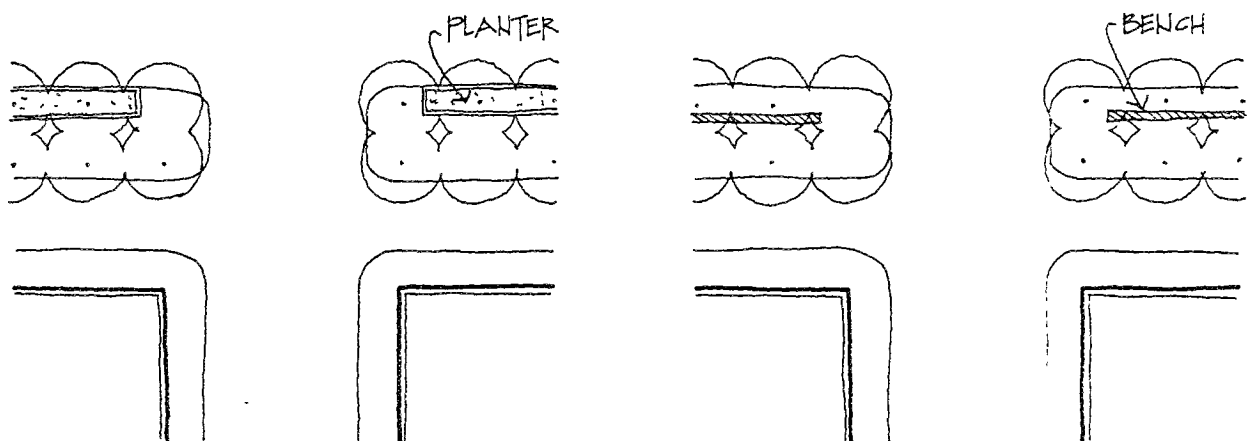


Figure 3.15.1. Continuous Planters or Benches



## 16. DIFFERENTIATING THE ROADWAYS

A design detail that increases the definition of the pedestrian realm is a slight rise (about one inch) at the entrance to the access way, possibly with the addition of a change in paving. This is especially useful in tight conditions where some extra protection of the pedestrian realm is helpful. The small break in paving makes cars slow down on entering the pedestrian realm, and makes them cautious on leaving. It creates a sensation on the access way that is somewhat akin to a driveway entering a street. Drivers act like they understand that it is their responsibility to use caution when re-entering the street, and defer to pedestrians while they are on the access way.

Another version of the same idea is to raise crosswalks slightly across the access way and use a different paving material (such as brick paving) to mark them more strongly.

On wide access ways, with two rows of parking, widening the sidewalk or the median with a bulb at the intersection, to narrow the entrance into the access way, makes crossing from sidewalk to the median easier.

These arrangements, and possible others, employ the basic principle of establishing a stronger boundary to the pedestrian realm, in order to protect it by clearer definition and by requiring cars to move slowly as they move into it.

### Illustrative Diagrams:

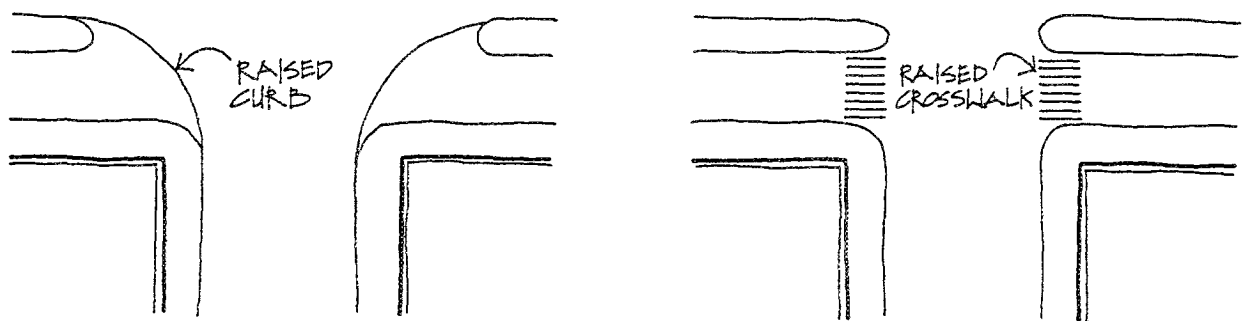


Figure 3.16.1. Differentiating with Raised Curbs

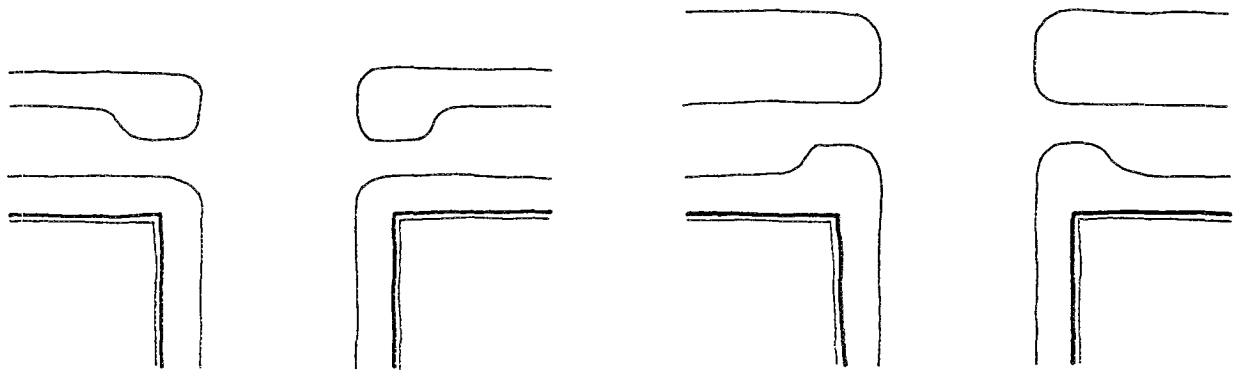


Figure 3.16.2. Differentiating with Median or Sidewalk Bulbs

## IV. CONCLUSIONS

### A conclusion of a two-year study

This report marks the conclusion of a two-year program of research on boulevards. It is appropriate to take stock and review what was intended at the outset and what was accomplished, and to speculate on prospects for boulevards in the future.

The point of departure for this study was a contradiction: personal experience of boulevards as great streets, alive with many people and activities, relaxed and without a sense of danger, versus the general conception held by professionals — transportation engineers and public officials — that they are unsafe.

It was important to find out if boulevards are indeed less safe than ordinary streets. Was the general sense of well-being on them misleading? Do statistics tell a different story than what one senses immediately upon walking and driving on boulevards?

These questions turned out to be harder to answer than was anticipated. Data was not always available, and when available it wasn't always in the right form for comparison with other cities. There were also doubts about the meanings of the accident statistics themselves — for instance, what was counted exactly? Even basic traffic counts were not always easy to get. Often, they were not real counts but estimates based on modeling which may be wrong, and significantly affecting the accident rate statistics derived from them. These difficulties increased the suspicion that the indictment of boulevards as unsafe was not based on actual accident and traffic data, but was a reaction against the number of potential conflict points that they include.

Despite these difficulties, the first phase of the study showed that boulevards are not less safe than streets with normal configurations carrying comparable amounts of traffic. If anything, a well-designed boulevard configuration can enhance safety, particularly pedestrian safety, on major urban streets. The significant fact is that boulevards have safety records similar to normal high-traffic streets despite containing many more potential conflict points at their intersections.

Another question of concern that prompted this study was the perceived negative effect of existing guidelines and norms on boulevards. Is it true that they make good boulevards impossible to build?

The answer to this question also turned out to be more complex than anticipated. Indeed, no single guideline or code deals a death blow to boulevards (except perhaps an insistence on holding trees back from intersections, supposedly to allow sight lines — but this guideline is often not applied at signalized intersections anyway). Rather, it was the combined effect of many guidelines, the professional tendency to overdesign roads with excessive lane widths and larger radii at turns, and, above all, the doctrine of "functional categorization of streets," which mandates restricted access to properties abutting major streets. Without access to abutting properties, boulevards do not make sense. The professional disfavor of boulevards seems to run deeper than just safety issues. The boulevard as a multi-functional street

form that combines and balances access and through traffic, and provides for pedestrians as well as for drivers with grace and safety, seems to question one of the fundamental principles of traffic engineering.

Perhaps the most significant finding of the first phase of the research was the understanding that what makes a boulevard safe and delightful is the establishment of a "Pedestrian Realm." This realm includes the access way, in which pedestrians are free to move with a minimum of concern from cars, and where cars move slowly and cautiously. On the best boulevards, the combined width of the two pedestrian realms, one on each side of the central through lanes, constituted at least 50 percent and more often 60 or 70 percent of the overall road width. This realm, however, cannot be created by decree, or regulation, but emerges only when several different physical and functional arrangements are present: a continuous tree-lined median, a narrow access way with parking and only one passing lane, and buildings that face the street. Often it also features relatively tight sidewalks, uses that draw pedestrians to the median, and a slight level change at the entry to the access way and/or a different rougher paving on the access way. When these conditions are not present, or when they are compromised heavily, a pedestrian realm will not emerge, or will be very weak.

In many ways the case studies of the second year of the research involved applications of the "pedestrian realm" concept in different contexts. At the same time, study of boulevards that were not working, like the Grand Concourse and Queens Boulevard, brought forth immediate and straightforward solutions. The contrasts between boulevards that were working well and those that were not helped to form design questions and, ultimately, design guidelines. The emergent questions were: What would it take to create good pedestrian realms in different types of streets, or repair them on a street like the Grand Concourse? What kind of spatial requirements are necessary, and what are the appropriate configurations in response to different urban contexts, with more or less pedestrian traffic? The question of context is not without subtleties in choosing whether a boulevard is an appropriate solution for a particular street, and in determining the details of the design.

### **The guidelines are the substantive conclusions of this research**

The guidelines are the substantive conclusions of the two years of research. They are a summary of the knowledge gained through field research, data analysis, looking at countless hours of video and film, and working through it all to understand what makes good boulevards. They represent a reflection, as well, on the process of design, and the solutions worked out in the case study designs, and the result of many discussions about the relative merits of one approach over another. It was, in fact, during these discussions that key insights, unrealized beforehand, often came forth as elucidation of "gut feeling."

### **Work still to be done**

There are issues, mentioned in the guidelines, that are not as well supported by solid research as others. They have been observed, but not always systematically. For example, less attention was paid in

this research to the through-going function of boulevards than to the local access function. It seems that boulevards enable smoother and easier travel in the central through-going realm than do ordinary high-volume streets. They do this at the same time that they accommodate local travel and pedestrians. However, a systematic study of through-lane capacity and driver comfort on boulevards and comparable arterials is yet to be done. The trees on the median have an impact on the central realm as well as on the pedestrian realm, but it remains to be researched whether and how they contribute to safety.

In fact, in general there is very little research attempting to tie the physical design of urban streets with safety performance, particularly with regard to major streets. The data that is collected on accidents and traffic volumes is rarely detailed enough or accurate enough in specifying physical location to make such a study easy. This seems strange, since physical form of streets is perhaps most under the control of city governments, and local governments collect accident data and might be most concerned with safety. There is a necessity for research on urban streets, where many conflicting movements are likely to occur, to determine why some streets fare better than others at allowing people to make movements safely. We still have much to learn.

### **Boulevards are great streets**

Boulevards are great streets, when they are well-designed, well-built, and well-maintained. They capture the imagination because they are grand and yet worldly. They are optimistic statements about the power and the magic of urban places, of cities. Though initially built by strong and unified city governments as symbols of potency and the establishment of the order of cities over the land, they have since evolved beyond their authoritarian origins.

Streets like the Esplanade in Chico, the Paseo de Gracia in Barcelona, and Ocean Parkway in Brooklyn speak at the same time of the grandeur of cities and of the ordinary day-to-day life of the people inhabiting them. It is the unique balance between the needs of through travel, that reflect the needs of the city as a whole, and the needs of automobile and pedestrian access, reflecting the needs of the local community, which has enabled them to become pleasant settings for everyday life.

It remains to be seen whether boulevards can be built in today's pluralist, and often fragmented, cities. Because of their multi-functional and multi-user role, boulevards, by their very nature, involve many different people. Therefore, in order for a street to be made into a boulevard, or redesigned appropriately, many different agencies at the city, state, and possibly the federal level have to cooperate. The changes also touch many citizens: residents in surrounding neighborhoods, commuters and business interests that depend on the through-traffic capacity of the boulevard. In today's cities, often lacking strong and cohesive political leadership, boulevards have to be accepted and understood by all the participants, and this is not an easy proposition.

It was often noted by the participants in the meetings that what was necessary to overcome the obstacles that may be put in the path of making new boulevards, or resurrecting old ones, was a will to

do it. This will could come from many levels, depending on the local situation. It could be at the political level of the city mayor or city councils, at the professional level of city administration, or from an entrepreneurial push by a developer or a business community along a stretch of a street

The key to making boulevards happen, and overcoming the possible conflicts with user groups, professionals, fire marshals, public works directors, and many others, is in understanding and communicating to all involved that the special thing about boulevards is that they cater to many needs and purposes, and that they do so in a balanced way. Although they may not meet everyone's expectations all of the time, they are usually a vast improvement over today's arterial roads, where only the fast-moving automobile's needs are acknowledged and met

### Signs of positive future

What is the prospect for boulevards in the United States? There are some hopeful signs. Citizens' groups, developers, and city administrations are beginning to see the importance of streets to urban life, and particularly that of major urban streets.

In the Bronx, devastated by freeway and expressway development, there is a growing appreciation for the importance of the Grand Concourse for local revitalization efforts. The ideas of the pedestrian realm, and the revival of the Concourse as a boulevard, seemed to have struck a positive chord there

Another example came to our attention recently.<sup>31</sup> In Cathedral City, California, redevelopment efforts are centering around a stretch of state highway that was the main street of the city. The city requested that the state relinquish control of the highway to the city, so a boulevard solution could be implemented. A special law allowing the state to do so was passed in the California legislature. Perhaps it is also a sign of the times. The State Department of Transportation (CALTRANS) is short of funds, and cannot be counted on for financial help in the project. Cities may be willing to go with projects on their own, provided it is done according to their priorities and needs. The significance of this law is that it restores some of the balance in the control of the street back to the city. No longer need the form of the street be determined solely by the needs of through traffic on a state highway. It might also be responsive to the needs of local businesses and residents for access and pleasant surroundings.

There is reason to believe that the opportunities that boulevards bring forth will be realized by people who aim to bring major urban streets back to life. As some of these projects are implemented, an opportunity exists to monitor the before-and-after conditions of traffic, pedestrian movement, and quality of the street. These may provide stronger evidence of the safety and desirability of boulevards as street types, and thus further remove professional doubts. It is hoped that the work presented in this and the report will contribute towards such a renewal of boulevards.

## Appendix: Summaries of Meetings with City Officials

### Notes from Presentation, 2/14/95: Proposed Designs for Geary Boulevard

#### PARTICIPANTS

Participants were from the City and County of San Francisco:

A Manager in General Engineering Services from the Department of Public Works, a Project Manager from Waterfront Transportation Projects, the Director of Service Planning and a Transit Planner from the San Francisco Municipal Railway (MUNI), a Bureau Chief in the Traffic Engineering Division, and a Transportation Planner with the Metropolitan Transportation Commission (MTC).

#### SUMMARY OF COMMENTS, REACTIONS

##### Responses to Design Alternative A:

- Traffic Engineer: Sidewalks need to be wider on side streets
- Researchers: Parking could be modified to allow parking on one side of access lanes only
- Trans. Planner: The transit platforms are too small. MUNI light-rail cars have doors on both sides
- MUNI planners: Design has traffic lights on center fast lanes and stop signs on access lanes. Due to lack of visibility turning left into center lanes, stop signs don't provide enough safety.
- Project Manager: Consider using signal lights on access lanes.
- Researchers: Design A follows existing design of Chico, Ocean Parkway, Eastern Parkway, all of which have decent safety records.
- MUNI planner: How to control the transit system?
- Public works eng.: Use transit control signals, synchronized with signals on access lanes.
- Traffic engineer: Hard for vehicles to cross Geary from the side streets.
- Researchers: Traffic on access lanes has to stop every block. This is intentional; to slow traffic and make it safer for pedestrians.
- Public Works Eng.: It's do-able, based on experience with the Waterfront-Embarcadero design.
- Traffic Engineer: Access lane widths too narrow for fast traffic
- Researchers: This is intentional and is observably a safer choice. New York boulevards studied are not safe because the access lanes are too wide and permit traffic to enter the center lanes too fast.
- Traffic Engineer: Center lanes too narrow to include a bicycle lane.
- Researchers: Bicyclists usually use access lanes.

- MUNI planner: Bicyclists comprise two groups: fast and slow. The fast would use the center lanes and would merge in with car traffic (Cyclists prefer stop signs, which they can ignore )
- Researchers: On observed boulevards, cyclists often travel on the access road against the flow of traffic. They adapt to existing conditions, as do the other users (drivers, pedestrians)
- Traffic Engineer: Access lanes too narrow for delivery trucks, which need a turning radius of 50 to 75 feet.
- Public Works Eng . Access lanes too narrow for fire trucks  
 Researchers Fire access can be from the center or from the median  
 Trans Planner Follow the examples of Cambridge, Boston, other cities get smaller fire trucks  
 May be more efficient and cost-effective in the long run
- Public Works Eng. There are historical exceptions to these width requirements You must present a good case for variations Just make a point of addressing fire safety issues in the proposal.
- MUNI planner: The rail transit boarding platform is too small (78 feet) San Francisco transit has two-car trains
- Public Works Eng : Even though MUNI light rail has a low platform (10 inches rise), you need to consider accommodating wheelchairs. This extends the length of platforms
- Project Manager: Extend the platforms (which will impinge on parking).

### Responses to Design Alternative B:

- There was a general discussion of lane widths Participants worried about safety because of the merging of access lanes into the transit tracks and platforms
- Public Works Eng : Why not use the access pattern on Berkeley's Shattuck Avenue of returning the access lanes to the center roadway before the intersection?
- MUNI planner: Or a composite of the two?
- Researchers: This option is more flexible, does more things, and is safe according to our findings.
- Public Works Eng : In order to keep transit in the center with exclusive right-of-way, and preserve the same amount of parking, you end up taking the space out of the sidewalks. Are the sidewalks then too narrow?
- Researchers. There is an expanded area between the buildings along the boulevard and the tree line, which creates a broad pedestrian realm You don't need such wide sidewalks
- Project Manager. The pedestrian feeling is good.



Public Works Eng.: Access to underground: The main problem with narrowing the sidewalks is what goes on underneath. Utility lines, phone and cable TV lines, irrigation lines for trees, etc., are all controlled independently. To install separate lines underneath the sidewalk you need 15 feet. Or you put them under the transit lane, the access lane, or the planting area, any of which poses more service and maintenance problems. You must ensure that planners and designers cooperate with engineers.

MUNI planner: Combine the lines. In new buildings, phone, cable, modem lines can be put inside.

Public Works Eng.: Possible, but very costly and time-consuming. Also, there are depth constraints

Project Manager: Not all sidewalks in San Francisco are 15 feet wide. It must be possible.

Trans. Planner: Common-duct banks make sense.

Project Manager: Are the narrow access lanes a problem for fire truck access?

Researchers: Same as Market Street (10 feet).

MUNI planner: For transit safety, 19.5 feet is the important measurement. It's the "traffic geometrics" (width of the vehicular traffic lanes) that's a safety problem.

Researchers: Ocean Parkway lanes are the same (10 feet)

Traffic Engineer: Yes, what exists, exists. But we're talking about new designs. And we need data on the relationship between traffic speed and accidents

Public Works Eng.: Are there data on accidents vis-à-vis lane widths?

Researchers: No.

Traffic Engineer: What about types of accidents? There would certainly be more sideswipes with such narrow lanes.

Researchers: There is no data. The important safety factor is the relative narrowness of the access lanes. This prevents speeding.

Project Manager: The irony is that federal and state regulations are not based on existing data, but on perceptions. We often over-design — we try to eliminate human responsibility and possibility for error.

Trans. Planner: Safety is more of a factor in the center lanes.

Public Works Eng.: Cleveland has 10-foot lanes.

Researchers: Barcelona boulevard traffic lanes are 8.5 feet.

Traffic Engineer: We need left-hand turn lanes on Geary.

Public Works Eng.: Consider alternatives: an extra-long yellow light for left turns.

Traffic Engineer: Not allowing left turns from the center lanes leads to more right turns and U-turns, which slow traffic and pose safety hazards.

Trans Planner: The "frustration factor" for driver is a major safety consideration

Public Works Eng : Left-hand turns across the transit lane slows transit speed  
A radical idea. Make turns ONLY from the access lanes. Put clear signage indicating the danger of crossing the transit lanes (a picture of a train car) if you violate the rule and try to turn left or right from the center lanes.

MUNI planner. What are the effects on transit speed of side-running vs middle-running tracks?  
You should do a traffic engineering simulation to check transit speed

MUNI planner: The transit lane is a problem in both designs. San José has problems; San Francisco has increasing problems with streetcars.

Project Manager Cars versus tracks is a universal problem, it's not a function of these designs — no more here than elsewhere.  
Design B provides sufficient visibility

MUNI planner Use traffic lights on access lanes to keep vehicles away from the transit tracks

Project Manager. That would be overkill.

Public Works Eng : Flashing yellow signal light for transit lanes

Trans Planner Stop on Red signal on approaches to the transit lanes

Public Works Eng : "No Turns on Red " The problem is that people don't realize how long it takes to stop a train as opposed to a bus or car

Researchers: Trees: What is your overall reaction to the trees, which are an integral part of the designs?

Public Works Eng : Tree planting You must consider nutrients, soil requirements for trees and for pavement engineering, types of leaves, maintenance, etc

Trans. Planner Tree height is important Must not block visibility.

Traffic Engineer: Catenary wires are 19 feet high.

MUNI planner Trees should not block view of storefronts for motorists in the center lanes

Researchers. The view is more important within the pedestrian zone. The trees in Design B are less obstructive in that respect.

Traffic Engineer: Drainage on three separate and converging roadways can be a problem.

Notes on Presentation, 3/28/95: New York City Session: Re-designs of Queens Boulevard, Grand Concourse

**PARTICIPANTS**

Most participants were from the New York City Department of Transportation, including a senior staff member from the Office of the Commissioner for Transportation, the Assistant Commissioner for Planning, the Assistant Commissioner for Traffic Intelligence, the Director of Pedestrian Projects, staff members from Transportation Planning and Planning departments, three staff members from the safety bureau, one of whom is responsible for pedestrian safety. Also present were a representative of Community Board #6 in the Borough of Queens and a colleague from Pratt Institute who assisted us in the research in New York.

**SUMMARY OF COMMENTS, REACTIONS**

- Planner. Can we add a bike path to the designs?
- Researchers: Yes; no problem. Can use the model of Ocean Parkway.
- Asst. Commissioner. Are trees simply a matter of aesthetics?
- Researchers. No. Trees provide a "transparent fence," or barrier, to set off the Pedestrian Realm "People don't like to hit trees." Light poles can also help create a barrier to protect the Pedestrian Realm from the fast traffic lanes in the center
- Asst. Commissioner: Ocean Parkway has a good Pedestrian Realm. People (pedestrian, bikers) are relaxed, they feel comfortable.
- Citizen Side access lanes are important and should incorporate two parking lanes and one slow traffic lane. The iron railing on Ocean Parkway creates a feeling of security for pedestrians. It has a bike path on one side only. Eastern Parkway used to have benches on both sides.
- Dir., Ped. Projects: The Grand Concourse intersections are confusing. Should they have a division between the two directions of traffic?
- Researchers: The access lanes have two stops. Vehicle priority is given to (1) center lanes; (2) intersecting streets, (3) side access lanes. On the Esplanade in Chico, all turns are possible, and this confusion creates caution.
- Planner: What is the minimum width of the median?
- Researchers: Thirteen to fifteen feet
- Citizen: The difference between safe and unsafe boulevards is land use. Ocean Parkway and Eastern Parkway are zoned residential. Queens Blvd. and the Grand Concourse, on the other hand, involve more commercial strips and more pedestrian traffic.

Researchers: Boulevards of this design are successful in Europe where they combine heavy commercial usage with residential areas and high volumes of vehicle and foot traffic. Boulevards were originally designed with multi-functions in mind, including commercial. One of the problems in this country is the practice of assigning one particular function to a street to the exclusion of others

Citizen European traffic is more disciplined  
 Your work is design-oriented and doesn't take sufficient account of operational realities.  
 Queens Blvd. has an ADT of 90,000. If the side lanes are converted to slow-moving, one-lane roads for vehicles, can the center lanes handle the added volume of through traffic?

Researchers Ocean Parkway has an ADT of 74,000, there is no capacity problem on the center lanes

Citizen: There is no street parallel to Queens Blvd to handle large traffic volumes

Safety Engineer On Queens Blvd , you would need to remove one of the parking lanes to accommodate truck deliveries.

Asst Commissioner Could we restrict delivery times?

Citizen, Safety Engr Impossible

Safety Engineer On Queens Blvd , the left-turn lanes are dangerous to pedestrians Also, the lanes on Queens Boulevard are wider than on Ocean Parkway; pedestrians need more time to cross

Dir , Ped. Projects Their designs feature the median to divide the crossing for pedestrians.

Researchers: Pedestrians go to the median without waiting for the light, then cross the center lanes on the light cycle; if there is not enough time they can stop in the center median.

Citizen. A major accident source is "pedestrian error" or "motorists failure to yield" to pedestrians. Queens Blvd. has the most ethnically diverse population on earth.

Researchers In the Pedestrian Realm, the people should be able to walk among the cars (on the side access lanes). The pedestrians rule, not the cars Without the concept of the Pedestrian Realm, the boulevard concept doesn't work. The emphasis is not to facilitate deliveries, but rather to accommodate people.

Safety Engineer: On Ocean Parkway, buses don't run in the middle (fast) lanes. On Queens Blvd. as you've designed it, buses and the people queuing up for them would interfere with traffic in the fast center lanes. They would also cause rear-end collisions.

Researchers Maybe we should widen the center to make four lanes, one for buses

Safety Engineer: I'm a consultant on a proposal to re-design Queens Blvd. The possibility of widening the median for pedestrians is being looked at.

Citizen: How can we invest in and maintain trees? We can't even get our tree pits cleaned. We rely on volunteers once a year. Can your design work without trees?

Dir , Ped. Projects: The public perception is that trees are desirable, even though they present maintenance problems. Volunteers will always be willing to help plant and maintain trees.

Citizen: On Queens Blvd., some trees have been destroyed by cars, and it takes years to get replacements. Who maintains trees? The Parks & Recreation Department or the Department of Transportation?

Asst Commissioner: Depends on whom you ask.  
However, the idea of setting off the Pedestrian Realm with trees is a good one. The mind set of a driver on a slow-moving access lane is, "Be careful"; on a 50 MPH street it's not.

Pratt Professor. On Ocean Parkway the trees are well cared for.

Dir , Ped Projects: It's a question of labor.

Pedestrian Safety: Has anyone done a cost comparison? Which is less expensive. a row of trees or the equivalent space in asphalt?

Researchers: Good question

At this point, the video was shown to the participants.

Asst Commissioner Good; makes your point.

Asst. Commissioner: Using red-light cameras, we observed several high-volume streets, including Queens Blvd. at 69th and Union Turnpike and Main Street. After one week, the number of drivers running lights illegally was 20-fold on Queens Blvd. The good visibility on Queens Blvd. leads to violations. Trees that extended right to the intersections would be safer; they would add to drivers' caution.

Safety Engineer: The fatality (as opposed to accident) rates are higher on Queens Blvd., Linden Blvd., and other boulevards.

Safety Engineer. Comparing Ocean Parkway to Queens Blvd , you have to realize that Queens Blvd. has more cross-pedestrian traffic because of its heavy commercial development on one side. We want to conduct a pedestrian safety study; we want to install more lights and more barriers to pedestrian crossing outside of intersec-

tions. How many feet should pedestrians have to walk between crossings?  
How many crossings between signals?

- Asst. Commissioner. There is an important difference between pedestrian behavior on slow-moving access streets (within the Pedestrian Realm) and on the center lanes
- Citizen. Crossing streets is a major safety problem for elderly people. Half of fatalities involve people over the age of 75.
- Researchers There is a noticeable increase in traffic speed on Ocean Parkway as it becomes more residential, where side lanes increase to two traffic lanes (reduced by one parking lane).
- Researchers Try to institute parking on access lanes on Queens Blvd and the Grand Concourse
- Dir, Ped. Projects: It's more complex than that.
- Citizen. To eliminate pedestrian barriers you have to argue with the federal DOT  
Could we try your Pedestrian Realm approach for one block on Queens Blvd.?
- Asst. Commissioner Suppose it works?
- Safety Engineer Merchants won't like to have the traffic reduced on the side access lanes
- Dir, Ped. Projects The Pedestrian Realm is definitely safer, pedestrians have a haven on the median
- Citizen Public transit has underpasses in New York
- Dir, Ped. Projects We need to study the issue of mid-block crossings by pedestrians.
- Safety Engineer Poor traffic flow on the crossing streets and the access lanes will create traffic jams.
- Asst. Commissioner Congestion is good; it prevents fatal accidents.
- Researchers Our design solutions and especially the creation of the Pedestrian Realm are simple. They are not a cure-all for Queens Blvd., but pedestrian fatalities would be fewer on the side lanes (where most of them occur)

## Notes on Presentation, 3/28/95: Fremont Session: Re-design of Mowry Avenue and Paseo Padre Parkway

### PARTICIPANTS

Assistant City Engineer, Transportation Engineer, Street Maintenance Superintendent

- Trans. Engineer: Sees many problems with access lanes, particularly with placement of loop detectors for activating street lights.  
People will not tolerate intersections being blocked on side access roads  
There will be resistance to change of access roads on Mowry Ave. into one-way streets.
- Maintenance. The designs are taking away pavement and replacing it with trees. We are trying to get away from landscaping. It is easier to get money allocated for pavement maintenance than for trees. Trees constitute maintenance difficulties. Deciduous trees in particular during the fall.
- Asst. City Eng.: Environmental Regulations for arterials mandate turning buildings away from the street because of excessive noise.
- Trans. Engineer. Worried about the traffic generated on access roads, and how it will affect traffic lights scheme.
- Asst. City Eng.: Boulevard would make more sense close to BART station
- Maintenance. Using some of the parking lot along Paseo Padre for new commercial buildings close to the street is a mistake. There is going to be limited parking available once the new hospital is built.
- Trans. Eng.: Bike lanes are necessary on Paseo Padre.  
Worried about capacity of roadway, and the expectations of people who are currently using it.
- Researchers: Do you think that the streets are improved by Boulevard designs?
- Trans. Eng.: People would not be able to see the advantages in changing an existing street; perhaps may be different if new street is designed as a boulevard from the start. In the commercial street, thinks that there are too many trees, and not enough parking. There is also a problem of visibility from the road.
- Asst. City Eng. There is not a single right answer. It makes sense closer to BART.
- Trans. Eng.. The city would do whatever the developer community wants in order to attract developers.

## Notes on Presentation, 4/27,95: West Sacramento Session: Re-design of West Capitol Avenue

### PARTICIPANTS

All the participants were from the City of West Sacramento, Department of Public Works. Present were the Assistant Public Works Director, the Community Planning Director, and a principal planner from the Community Planning department and two Associate Civil Engineers.

### SUMMARY OF COMMENTS, REACTIONS

Planner CD	There are long stretches on West Capital in West Sacramento with "no turn-around opportunities."
Researchers.	Use the side access lanes
Asst PW Dir.:	This is similar to the "frontage road" concept along freeways
Planner CD	You should look at Merkley Street in downtown West Sacramento We took a four-lane stretch about a block long and converted it into two diagonal parking lanes with two traffic lanes Similar to Shattuck Avenue.
Assoc Civil Eng :	The design would work better on 3rd Street (another street in W Sacramento) — not on Hwy. 275 or West Capital Avenue
Asst. PW Dir	What are the speed ranges for the main boulevard and the side access lanes?
Researchers·	Varies, depending on each street's primary and secondary uses (pure commercial, residential, mixed-use, etc ). Generally, speeds in the center lanes are between 35 and 40 MPH and 10 to 15 — even 5 to 10 — MPH in the side access lanes
Asst PW Dir ·	Your design priorities are safety and movement. Therefore conflicts of movement should be your primary goal.
Researchers.	Let's focus on pedestrian behavior. They are drawn into the median area, which breaks up their crossing. Therefore we can use faster lighting patterns.
Planner CD·	Streets are very different from one another, and people's behavior on them varies accordingly
Researchers:	In our research, when we made direct comparisons we compared streets with similar traffic characteristics to one another.
Planner CD:	Where do the buses travel?
Researchers·	In the center lanes.
Planner CD.	There are no turnout lanes. What happens in the event of a breakdown in the center lanes?



Researchers: People adapt; they find solutions. (Refer to video.)

Asst. PW Dir.: Have you been able to examine data over time? For instance, a Caltrans computer simulation?

Researchers: We haven't run computer simulations. However, we used many other techniques to observe traffic and pedestrian behavior patterns on existing boulevards and streets (time lapse photography, videotape, measurements, counting, etc.).

Asst PW Dir.: From the engineer's point of view, there are many no-nos in your designs. The sight lines, for example, are bad: you have trees blocking drivers' "cone of vision."

Researchers: Is there any actual data to link loss of safety with impaired sight lines cause by trees?

Assoc Civil Eng.: The Caltrans standards.

Researchers: Yes, but what are their standards based on?

Asst PW Dir.: Have you looked at accident rates statistics.

Researchers: Yes, but they don't show the causes of accidents. Our research is questioning the wisdom of such arbitrary regulations and standards

Planner CD: What about Shattuck Avenue in Berkeley? That was a retro-fit situation. Were you able to examine data before and after the re-design?

Researchers: No. All data in Berkeley are compiled by census tracts, not by streets or by intersections.

Researchers: We have better accident rate data from New York City and from Chico.

Asst. PW Dir.: This is a serious problem. I worked as a consultant on some R&D contracts for storm water pollution. There was no base data from which to draw conclusions by comparing with the new data we were compiling

Assoc. Civil Eng.: Your designs don't take into consideration the liability issues. Because of Caltrans standards, it's easy to be sued over "insufficient sight distance."

Asst PW Dir.: We lost a \$3 million lawsuit because a guard rail (into which an inebriated driver plowed) "did not meet Caltrans standards." We can't afford to disregard industry standards.

However, the idea of slowing down traffic to enhance safety has been incorporated into the new city guidelines, and we are advising a narrowing of traffic lanes for this purpose.

My "dry engineering sense" objects to the poor sight lines; the many conflicting movements; and the intersection controls. Re access lane stopsigns: drivers get

"mixed signals"; both the access land and the intersection street traffic have the right-of-way at the same time.

Researchers: This will lead to caution and slower driving speeds.

Asst PW Dir.: Where will delivery and other trucks park?

We have long-term plans for a light-rail system to extend into West Sacramento. And legislation has passed to extend Capitol Mall to West Sacramento. The West Sacramento and Sacramento Redevelopment Agencies want to create a pedestrian corridor and bridge between the two cities

Would you be interested in using a portion of West Capitol Avenue for a long-term study to test your designs? Our streets are wide enough to fit your designs

Researchers: Yes; maybe we can pursue joint funding

Planner CD: You should look at Merkley Street in downtown West Sacramento. We took a four-lane stretch about a block long and converted it into two diagonal parking lanes with two traffic lanes. Similar to Shattuck Avenue's no evidence of correlation between sign visibility and a business's success.

Planner CD: What are optimum block lengths?

Researchers: Depends on local circumstances. Generally, though, when crossings are spaced over 600 feet apart, jaywalking increases. Jaywalking, in combination with elevated traffic speeds, is a deadly combination.

Planner CD: What is the optimal distance between intersections and driveways?

Researchers: Driveways shouldn't be close to intersections.

Planner CD: What is the optimal distance between driveways?

Researchers: (Description of Ocean Parkway, and the speeding up of traffic along the side access lanes caused by eliminating one parking lane to accommodate driveways and increasing traffic lanes to two.)

Planner CD: Are boulevards designed on grids?

Researchers: Yes, in Europe. Also K Street in Washington, D C , and The Esplanade in Chico. In New York it's a hodgepodge.

Assoc Civil Eng : On Chico's Esplanade only every other intersection has a signaled intersection and allows left turns. This reduces conflict points. To cross the Esplanade, drivers know to go to the signaled streets — even during the fall season when the city has a new influx of drivers (entering students). "The Esplanade works "

## Notes on Presentation, 4/27/95, Sacramento: Re-design of Capitol Avenue

### PARTICIPANTS

All the participants were from the Sacramento Department of Public Works. Present were the deputy director, a Supervising Engineer in Transportation Planning, and a Traffic Engineer.

### SUMMARY OF COMMENTS, REACTIONS

- Deputy Director: Intersection spacing. Do they work?  
Researchers: Yes. The current block lengths are fine.  
Designing the Capitol Mall was easy. It has distinct end points, and most of the side intersecting streets are one-way.
- Traffic Engineer: Concerned with pedestrian safety. Design B: Where do pedestrians cross? How do you incorporate bike lanes?
- Deputy Director. In Design B, who uses the center median?  
Researchers. Pedestrians
- Deputy Director You might have a problem with left turns
- Trans. Planner Design B with the large center median is good. There is a large pedestrian population who uses the Capitol Mall as a strolling environment.
- Traffic Engineer: Where would the light rail be?  
Researchers: In the center.
- Deputy Director: Could we use the comparison of the Esplanade and Mangrove to demonstrate their relative safety?
- Traffic Engineer: There are actual vs. perceived dangers.  
Your designs fail to consider liability issues.
- Researchers: We don't have all the answers. We're just trying to present the options.
- Deputy Director The designs would both be good applications for Capitol Mall. The access lanes would be adequate, and there would be ample short-term parking. Also, they add flexibility for driveways. The City Redevelopment Agency wants more access. These designs would work. Also, the agency is familiar with other urban examples that work, they would be more impressed with your actual designs for Capitol Mall.
- Traffic Engineer What is the primary purpose of your boulevard model?  
Researchers: We are questioning the reliability of existing safety standards and guidelines.  
There is public dissatisfaction with nondescript, wide streets that respond only

to the needs of through traffic and ignore the needs of pedestrians and slow-moving traffic. Also, there is no money available to build new roads. Our designs allow us to adapt existing streets and encourage us to plan for multiple-function streets.

- Traffic Engineer Design A is "much less safe" for pedestrians. It incorporates too many points of contact. Design B is better.
- Researchers Keep in mind, however, that traffic on the side access lanes will be very slow.
- Trans Planner The trees create a canopy. Does this also result in slower-moving traffic?
- Researchers Yes.
- Trans. Planner What about peak loading times in the access lanes?
- Researchers. Big office or major-use buildings (hotels) would need side exits and entrances. Yes. It's possible.
- Trans. Planner These designs are excellent for parking on the street. The City is considering reviving their historic trolley line. They may (1) use the existing tracks on K Street, or (2) take the trolley down Capitol Mall. Would (2) work with your designs?
- Researchers. Yes, it could be accommodated.
- Traffic Engineer I favor Design B, but add another through traffic lane in the side access lanes for fire trucks and other emergency access.
- Researchers This would create more danger (traffic on the side access lanes would move faster).
- Trans. Planner The Fire Dept. is always a major obstacle to re-design schemes. They insist on an adequate (or more than adequate) turning radius for their big trucks in side access lanes.
- Traffic Engineer We did a study between 4th and 5th Streets. We added a loading zone, but Caltrans wanted us to go back to two lanes of traffic.
- Trans Planner We could use Design A for newly developing areas with higher traffic volumes. (Discussion about dedicated streets: Developers pay for first 24 feet from buildings — they are repaid later out of city revenues.)

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## NOTES

<sup>1</sup>See Jacobs, Rofé, Macdonald, *Boulevards: A Study of Safety, Behavior, and Usefulness*, Institute of Urban and Regional Development, University of California at Berkeley, Working Paper No 625, November 1994

<sup>2</sup>Jacobs, Rofé, Macdonald, *Boulevards: Good Streets for Good Cities*, University of California Transportation Center, video no 1, 1994

<sup>3</sup>In retrospect it might have been advisable to stress traffic engineers, civil engineers, and appropriate public works engineers. In two of five cities, San Francisco and New York, these professionals were not as fully represented as we might have wished and were somewhat in the minority as compared with professionals from other disciplines, e.g. city planners, community development staff, service planners, and representatives of special projects

<sup>4</sup>Source: New York City Department of Transportation

<sup>5</sup>Source: this figure is based on counts provided by the New York City Department of Transportation. It seems rather low, considering the amount of traffic observed on Queens Boulevard. Indeed, estimates based on interpolation of the researchers' own counts indicate an ADT of roughly 60,000 vehicles

<sup>6</sup>Source: Geary Transit Task Force Final Report, 1989 (1986 weekday traffic volume between 9th and 10th Avenues)

<sup>7</sup>Source: Sacramento, Department of Public Works, Traffic Engineering Division, Traffic Counts — Average of 1988 and 1993 counts

<sup>8</sup>Source: Based on 1992 counts provided by the Department of Public Works (Count taken between Maple and Poplar)

<sup>9</sup>Source: Based on 1995 counts provided by the Fremont Department of Public Works (Count taken north of Mowry)

<sup>10</sup>Source: Based on 1995 counts provided by the Fremont Department of Public Works

<sup>11</sup>For detailed summaries of the meetings see the Appendix

<sup>12</sup>Institute of Transportation Engineers, *Fundamentals of Traffic Engineering*, Washington, D.C.: ITE, 1992

<sup>13</sup>See Marshall Berman, *All that is Solid Turns into Air: The Experience of Modernity*. Penguin Books, 1982: 57

<sup>14</sup>See Allan Jacobs, Yodan Rofé and Elizabeth Macdonald. *Boulevards: A Study of Safety, Behavior and Usefulness*. University of California, Berkeley: Institute of Urban and Regional Development, Working Paper No 625, 1994

<sup>15</sup>Particularly wonderful examples of this quality are Ocean Parkway and Eastern Parkway in Brooklyn, NY. There is nothing spectacular about the buildings that line these boulevards. They are normal three- and four-story apartment houses similar to those found on adjoining streets. Nor is the population living along them unique. However, these streets still command a wonderful presence, and are used much by people, in all the different ways we have mentioned. Even the Grand Concourse in the Bronx — despite its present sorry state — has some of that presence, and much potential

<sup>16</sup>See American Association of State Highway and Transportation Officials (AASHTO), *A Policy on Geometric Design of Highways and Streets*, Washington, D.C.: AASHTO, 1990: 538-542

<sup>17</sup>This issue is not unique to boulevards. It is a fundamental issue about streets and urban life, that has enormous implications for the well-being of cities. It is connected to the issue of boulevards, because the primary reasons why large stretches of urban roadways are not fronted by buildings, and not enlivened by doorways or watched over by people from windows, is directly a result of the functional categorization of streets that was devised as a way to facilitate vehicular traffic in the city

<sup>18</sup>Two examples in Paris exemplify this arrangement. The Boulevard Courcelles, that runs in part along the Parc Monceau, and Ave Franklin D. Roosevelt, that is completely one-sided and has two museums along one side

<sup>19</sup>The guideline of roughly half is not meant to be an absolute, and good judgment is needed in establishing the dimensions of each realm. It does however reflect the importance of balance between the through-going functions, and the local functions of the street. The more that the balance is weighted towards the car and the center road-

way, the less comfortable and safe is the boulevard likely to be for pedestrians. The more it is weighted towards the pedestrian realm, the less useful is the street likely to be as a way to move quickly from destination to destination.

<sup>20</sup>In the discussion of widths of the boulevard and its constituent parts, one should be aware that the lane widths proposed here are narrower than what is currently the norm in the United States. Previous research conducted in this study has shown that, on boulevards, increased width of lanes can cause reduced safety, particularly in the access ways. For a fuller discussion of the matter see pp. 90-91 and 111-114 in Jacobs et al. (1994). For specific lane width guidelines see Section 11. Lane Widths.

<sup>21</sup>These issues are fully discussed in Elizabeth Macdonald, *Multiple Roadway Boulevards. Historical Evolution, Physical Form and Modern Day Usefulness*, Master's Thesis, Department of City and Regional Planning, UC Berkeley, 1995.

<sup>22</sup>See Jacobs et al., op. cit. 81-88.

<sup>23</sup>The dimensions of the center realm are rarely less than four lanes of traffic (two each way) or more than six lanes of traffic (between a minimum of 40 feet and a maximum of about 70 feet). The dimensions of the access way are determined by whether there are one or two lanes of parking and need to have relatively narrow lanes (typically the access way will be between 14 to 25 feet). Normally, there are good reasons to keep the sidewalk width limited to approximately 10 to 20 feet (see Section 13. The Distribution of Pedestrian Space Between Sidewalks and Medians).

<sup>24</sup>See for example the prominent place of Commonwealth Ave. in mental maps of Boston shown in Kevin Lynch, *Image of the City*, Cambridge, Mass., MIT Press, 1960.

<sup>25</sup>See Robert Cervero, *Transit Supportive Development in the United States: Experiences and Prospects*, University of California at Berkeley: Institute of Urban and Regional Development, Monograph No. 46, March 1994.

<sup>26</sup>An example might be the Paseo de Gracia in Barcelona. Besides having dedicated bus and taxi lanes in the center realm, with bus stations at every second intersection, it has a subway line running underneath it, and includes also a subterranean station for the regional and national train network. One can get on board an international train right there in the center of the city, or connect easily from one mode to another.

<sup>27</sup>See Jacobs et al., op. cit. 102-104.

<sup>28</sup>See Jacobs et al., op. cit.: 81-83 and 110-113.

<sup>29</sup>Only very busy shopping streets like the Paseo de Gracia in Barcelona, or the Champs Elysée as it was recently reconfigured, have enough pedestrian density to enliven very wide sidewalks.

<sup>30</sup>See Jacobs et al., op. cit.: 94-101 and 109-110.

<sup>31</sup>This information was brought to our attention by a recent issue of *Livable Places Update*, Sacramento, CA. Local Government Commission, May/June 1995.