RESIDENTIAL STREETS:
A Vocabulary of Elements

micheline papadakou

Barnard College, B.A., 1972

submitted in partial fulfillment of the requirements
for the degree of Masters of Architecture
at the

Massachusetts Institute of Technology

June, 1976

Signature of Author

Department of Architecture, May 17, 1976

Certified by
Chester Sprague, Associate Professor, Thesis Supervisor
Dolores Haydee, Assistant Professor, Thesis Supervisor

Accepted by
Michael Underhill, Chairman, Departmental Committee for Graduate Students
ABSTRACT

RESIDENTIAL STREETS: A VOCABULARY OF ELEMENTS

Micheline Papadakou

"Submitted to the Department of Architecture on May 17th, 1976, in partial fulfillment of the requirements for the degree of Masters of Architecture"

This thesis is about what a residential street can be
for the people who live on it
for the children who play on it
for the people who drive on it
for anyone who uses it

It is an attempt to show the potential of the residential street as a place for living

It is the beginnings of a designer's workbook of tools for the making of residential streets

It is also an expression of my care for the environment that surrounds us

Thesis supervisors:

Chester Sprague, Associate Professor
Dolores Hayden, Assistant Professor
to my mother, for all her dreams...
ACKNOWLEDGEMENTS

I would like to thank all the people who helped me with this thesis, and in particular Chet Sprague and Dolores Hayden from M.I.T. and Jos Weber from T.H. Delft, who acted as my supervisors, as my moral supporters and as my friends; Eileen Shapiro, whose comments improved the quality of the writing; Thijs de Jong and Anton Kribbe, who provided me with valuable material on their work in the Westerkwartier; and most of all, Steve Young, who stayed by my side with a great deal of help and support throughout.
## CONTENTS

### I. INTRODUCTION
1. Statement of Interest 1.1
2. Statement of Purpose 1.5

### II. GENERAL APPROACH
1. Discussion of Street Issues 2.1
2. Organization of Thesis 2.7

### III. PLACE DEFINITION
1. Places for Vehicles 3.1
2. Places for Pedestrians 3.9

### IV. TRAFFIC
1. Segregation of Traffic Modes 4.1
   a. Pedestrian Streets
   b. Car and Pedestrian Streets
   c. Two-Way Traffic
2. Speed Control 4.11

### V. SCALE
1. Definition of Small Scale Spaces 5.1
2. Dimensions 5.14
3. Warmth 5.20

### VI. USE
1. Public Utilities 6.1
2. Public Amenities 6.8

### VII. PERSONALIZATION
1. Identification 7.1
2. Towards Private Use 7.13
3. Frills and Such 7.20

### VIII. CONCLUSION 8.1

### IX. APPENDIX
1. Westerkwartier: General Information 9.1
   a. History
   b. Setting for the Renovation
2. Westerkwartier: Process 9.15
3. Westerkwartier: Comments 9.26
   a. Tuinstraat: A Solely Pedestrian Street
   b. Considerations

### X. LIST OF FIGURES 10.1
I. INTRODUCTION
1. STATEMENT OF INTEREST

My interest in residential streets started growing slowly during the past few years and was constantly reinforced by visiting places that felt familiar and comfortable, places that presented a coherent image of a neighborhood whose residents took pride in and cared for the public space that surrounded their homes. In contrast, I also saw places where the streets looked grim and isolated from whatever life went on in the homes around them, places with neglected and uncared for streets, places that presented a forbidding or desolate street image.

A street is a place that is experienced every day by the people who live on it. It is in the public way in front of people's homes where residents' cars must drive and where their houses border and look upon. The communal part of the public way does not exist independently of the life that goes on around it. It also exists to provide reinforcement to that life, and in that sense it becomes part of the home domain.

The residential street should be and can be a place where people have the opportunity to present their home image to the world. I often walk on neighborhood streets and I look at windows, doors and stoops and I expect them to tell me who the people are who live inside the walls, what they might like, how they feel about their home and what they think about their street.

It is in the streets where people might meet each other as neighbors, and where they might interact on a casual level. It is in the streets where children can play and where they can first begin to experience and learn about the world that surrounds them.
It is in the streets where something special might happen that can be seen through the window curtains of a home. It is in the streets where one might take a walk for pleasure and where one must first face the world outside his home every morning.

Of course, the street has many more functions than those of presenting one's image to the world, and serving as a place to socialize, play and observe. It is also a place for necessary movement to and from one's home (by car, bicycle or on foot); it is a place from which homes are serviced and deliveries are made, where cars are parked and garbage is collected. It is a place that provides information to people on a variety of levels: an election campaign car may cross the residential streets with loudspeaker announcements, a vendor may shout his merchandize, a public light-post may display advertisements and other information.

The residential street is a complex environment with many functions and purposes that need to relate to each other and often also need to reinforce each other. In this thesis I have looked at this environment and brought up some possibilities of dealing with it both as a designer, and also as a resident.

In addition to my personal interest in the subject as a motivating reason for writing this thesis, a number of other reasons prompted me to investigate issues related to residential streets. During the course of my teaching assistanship at M.I.T., I had to assist students to design a site plan which called for a residential setting, including streets. I often found that students were lost in their effort to approach the mere notion, let alone the design, of a street. For many of the students, "cars", especially private ones, had slowly become a dreadful menace that competed with their
1.3

very owners, and it was difficult for the students to go beyond the definition of a street as a 30-foot wide asphalt strip that was an "ugly necessity" for the "sake of cars". Having difficulties in dealing with the conflicts that arise between accommodating cars and pedestrians on the same street, students often proposed to eliminate all car traffic and constrict private cars to parking lots at the ends of the site, a condition hardly satisfactory to elderly and disabled residents, or even to people carrying large bags of groceries. It was also difficult for students to visualize a street environment in its full potential use, with possibilities for definitions of private and public residential domains that reinforced each other and coexisted in harmony.

I believe it would have been helpful to these beginning students to have had a resource of compiled material that related to the street environment in residential settings and provided some design elements for streets, a resource in which a student might find the germ of his individual approach to the subject.

There are a number of studies that have been made on streets, and a considerable number of books have been published on the subject. The majority of these studies however, are divided into two categories: the first is primarily a theoretical approach to the design of streets, often on an urban planning scale, accompanied frequently by precise rules and mathematical formulas that certainly give considerable information on particular technicalities, but provide few resources on how to deal with that smaller scale treatment of residential streets which would contribute to the making of an environment that is pleasing and useful to its residents.

The second category of studies and books consists primarily of
visual displays of pleasing and useful street environments with, however, little analysis that could provide concrete help to a designer on how he might strive to produce environments with similar qualities in the streets.

Another issue that in part led me to select residential streets as my thesis topic derives from my interest in adaptive housing and change-over-time in residential environments. Considerable attention has been paid by a number of designers to the adaptability of housing as it relates to life style changes, but few attempts have been made so far to look at the same time at the adaptability of the street bordering that housing, or to analyze what that adaptability might consist of in terms of physical design. Even though my thesis does not deal directly with this issue, I hope it can at least bring it up as an important area to be studied.
2. STATEMENT OF PURPOSE

One of the primary purposes of this thesis research is to address certain issues and concerns that a residential street entails, and to analyze a variety of physical design elements that can be used as tools in the creation or change of a residential street and that contribute to the success of the street environment for the residents.

Even though the definition of "success" of a residential street is difficult to arrive at in objective or overall terms, I have made value judgements, based primarily on the appearance of the environment and on the observed interactions of the residents with the street on which they live.

In order to effectively analyze the physical design elements that operate on a residential street, it was necessary to define certain zones of the street domain (public, private and transition) that in turn involve areas of concern, such as children playing on the sidewalk or cars parked against the curb. This simple, though limited, zone definition and related issues are described in detail in the following chapter.

The physical elements analyzed in this thesis have been extracted from existing environments as I have personally observed them. The use functions that these elements reinforce also relate directly to the environments observed. The main source material of examples and illustrations has been Westerkwartier (WK) in Delft, Holland, a residential quarter for low-income workers which underwent recent street renovations. Wherever the analysis of physical elements employed in the WK could be amplified by the addition of
elements from other places, I have done so.

A second primary purpose of this thesis is to define for other designers the context in which physical design elements can be most useful. It is my strong belief that a street environment can be best suited to its residents only when they have the opportunity to influence it and to determine, at least in part, the functions that the street must fulfill for them. For this reason, it is necessary for the designer not only to understand the use of physical design elements but also to be able to apply them in such a way as to best meet requirements set by the residents of the environment. Also in this context, WK has been my major source of examples because of the particular process involved in the renovations of its streets. In the latter part of this thesis, I explain in detail the strategies, purpose and results of the government-designer-resident participation that took place in the WK (see Appendix, sections 2 and 3).

Because WK has been used in this thesis as the primary source of material for illustrations as well as for analysis, a summary of its historical and social development is provided in Appendix, section 1, so that the reader may be best able to place the WK environment in its proper context.

In short, the scope of this thesis is:

1. to view the residential street as an important place for people and as a contributor to their personal and communal development and interaction;

2. to create the beginnings of a designer's workbook that can suggest ways to understand and use a variety of physical elements that address issues involved in creating a successful street; and
3. to indicate processes through which the residents of a street can determine as much as possible which issues the designer need be concerned with when he employs a vocabulary of physical design elements.

This thesis is intended only as a beginning of research, research that should keep growing through the years. The topic of residential streets is extensive even within the limits set in this thesis, and it requires continuous attention and care, which I hope to go on giving it.
II. GENERAL APPROACH
1. DISCUSSION OF STREET ISSUES

A limit to the scope of the subject of this thesis—i.e. residential streets—must be set in order to ensure a focus of manageable size. The thesis concentrates on residential streets in urban areas with medium and high density, low-rise housing*, with examples for analysis derived from existing environments in Europe and the United States. In brief, the following reasons have led me to set this limit.

As I have discussed earlier, I view the street as a place that should serve a variety of functions and users. It is mostly in urban areas that there is a limited availability of space in residential quarters. The organization of housing density is usually such that a public way is limited in size yet must take on a number of functions for its residents: it must serve not only as a means of vehicular and pedestrian traffic, but it must also provide a harmonious and comfortable setting for the inhabitants. Children often have no other immediately available play space than the street in front of their homes. Watching the happenings on one's street is a form of entertainment for adults as well as for their children. Social contact, public services, access, utilities, and information distribution are all functions that the urban residential street must assume.

There are often a number of other places in urban residential quarters that can accommodate some of these activities. Children can play in a neighborhood playground, for example, and adults

---

*urban: city and town
density: 40-50 dwelling units per acre
lowrise: up to six storeys maximum.
can take a leisurely walk in a nearby park. Nonetheless, the street can provide more opportunity for a variety of simultaneous uses because of its close association with the home base. Even more important, it can allow for spontaneity in determining the use and for casual interaction of residents with each other and with their immediate residential environment.

It is true that residential streets in non-urban areas must assume similar functions. Yet the need for maximum use of a minimum public space is not as pressing in suburban and rural areas, for house yards often accommodate a number of the requirements, such as children's play area or space for leisure sitting.

In very high density housing the large number of people subtracts from the familiarity of faces in one's street. Knowing or recognizing hardly any of the people who use one's street reduces considerably the feeling that the street is a communal space in which residents have some control. Very high densities also imply a large number of private cars. Priority for parking and traffic speed requirements is unavoidable, where the car is a daily necessity. The pressure imposed on the residential street by the number of vehicles that claim space on it considerably restricts the potential for multiple use of the public way.

The physical elements of the residential streets in low-rise housing districts are more evident than those of residential streets lined with high-rises. It is my belief that, in order for residents to be in contact with the public environment that immediately surrounds their homes and to feel that they can participate in it and influence it, it is necessary to have a
direct association of the private domain with the public one. This association need not only result from living on the ground floor. Watching from an upper storey window or balcony and being able to see and hear the children on the street, the parked car, the vendor and his merchandize gives one a feeling of awareness of the happenings on the street.

However, visual and oral contact become difficult in residential buildings more than four storeys high, and they completely disappear above the sixth floor. Isolation of private and public domains is inevitable in high-rise housing, and the street can no longer meet many of the residents' needs. Lobbies and communal corridors in high-rise housing begin to substitute for the street life to some extent, and the public way on the ground becomes mostly a place where service and major access can occur.

Most of the functional settings that a residential street can provide for its users overlap occasionally. Certain of these functional settings overlap continually, as for example a parking space used for children's play. Yet in most typical residential streets, these overlaps are neglected and often prevented by physical and psychological barriers. "Don't cross the street" is one of the most common phrases one hears as a child, to the point that the street is dangerous, almost forbidden territory. The public and private domains are almost completely segregated, and there is no transition between them. One type of user normally takes over the public zone and little interrelation of functions is encouraged. Cars, either moving or parked, usually
dominate the major part of the public way at the expense of the pedestrian, not only because they require the largest amount of space and its exclusive use, but also because moving cars usually restrict the pedestrian to the sidewalk and present a serious accident hazard to children playing on the street.

In presenting issues that deal with the residential street, I have devoted considerable time discussing "cars"*. I do not intend to present cars as the major issue in the treatment of a street; yet the restrictions that have been imposed by cars on the use of the public way make the emphasis important and necessary. The potential speed of car movement is incompatible with that of pedestrians. The dimensions required for the car speed are large and demand so much physical area of the public way, that little is left over for other than traffic uses.

Since its invention, the automobile has slowly become a part of our daily lives. For some people it is a necessity, for others a possession in which they take pride, and for others yet it is both. We have introduced the car into our lives and we have even organized our lives to some extent to depend on the car. We have invested in streets that accommodate cars, and we have accepted (or tolerated) their full presence in our residential environments.

*In this thesis I talk mostly about "car" instead of "vehicle". My intent is not to exclude the concerns for other vehicular modes of transportation and service. Due to the concentration of the analysis on residential streets, however, I found the private cars to be the great majority of the vehicular users. I have talked about bicycles to, an extent, and I have occasionally addressed issues related to trucks and service and emergency vehicles.
Yet somehow, we have not always found positive ways of dealing with the car in relation to the pedestrian. Our streets are literally infested with parking meters and a multitude of signs. "Do Not Walk", "Tow Zone Area", "Pedestrians Only", "Snow Emergency Street", "No Parking", "No Standing Anytime", "Vehicles Prohibited", and so many other exhortations often reflect a conflict in the use of our streets. As drivers we are often frustrated because a pedestrian tries to cross the street in front of us, and as pedestrians we get upset at a driver who parks in front of our garage door or who nearly runs us down when we try to cross the street.

And yet so many of us are both drivers (or co-passengers in a car) and pedestrians; we want our children safe on the streets, we want to drop groceries off at our front door, we want to cross streets without fear, and we want our cars securely close at hand. We have introduced the car into our lives, we have tolerated and even accepted it, yet it still presents us with tremendous conflicts.

Just as there are serious disadvantages when vehicular traffic is the major determining factor of the use of a public way, a complete pedestrian dominance at the exclusion of vehicles also presents a number of difficult problems. In certain residential streets the car has been banned so that pedestrian users can "take over". Even when appropriate equipment is provided for the pedestrian's use in those streets, this solution does not integrate the need for the automobile into our environment. Residents of an experimental pedestrian housing area in Emmen,
Holland, complained that their safe streets were extremely "dull"; the amount of activity on the streets was considerably reduced because of lack of residential traffic which would have afforded them with something exciting to watch. Residents of a pedestrian street in Delft, Holland, were faced with a serious parking problem after barring their own cars from traversing their street, and they imposed an additional parking load on the bordering streets in the neighborhood.

In this thesis I have tried to analyze in part the conflicts that arise from accepting cars in our residential streets and to present ways of dealing with them. I believe the car is "here to stay" because most of us want it to stay. But I also see us as pedestrians who need to co-exist better with the car we want and like. The need to find ways of incorporating cars harmoniously in our residential environments is real and pressing. I do not think it adequate to continue a policy of tolerance and frustration that arises from a compromising symbiosis of cars and pedestrians. We need to address the possibilities of positive interaction, of mutual attempts to work out the conflicts, and of better than a forced co-existence.
2. ORGANIZATION OF THESIS

Before attempting to present the physical design elements that occur on residential streets, it is necessary to briefly explain my organization of material.

I have tried to analyze various physical design elements by discussing them separately to the extent possible. The analysis consists of determining the effectiveness of a design element in addressing one or more areas of concern where residential streets are involved. For purposes of organization of this thesis and of future usefulness of the material, I have defined five major issues of concern for residential streets:

- Place definition for cars and pedestrians
- Traffic considerations
- Scale of elements on the street
- Use of the street
- Personalization by the residents.

It is not always possible to isolate relationships among issues and physical design elements. A particular element will address more than one issue; design elements are often employed together in an effort to deal with a particular concern; and it is the constellation of more than one element that achieves a positive result. Nonetheless, for clarity of presentation, each issue is discussed separately and elements are presented consecutively for the most part. Points of analysis are illustrated with sketches, and examples of existing solutions are referred to, wherever available.

I have chosen examples to illustrate the analysis primarily from cities and towns in Europe and the United States because I have spent considerable time studying these residential areas.
Since my intent is to discuss the effectiveness of physical design elements in residential street environments, I have found it necessary to rely mostly on analyzing environments that I have personally visited and experienced. My references to "typical" treatment of residential streets, therefore, refer only to settings in Western cities.

At the end of each chapter there is a set of two photographs from Delft, Holland. In all cases, the photographs are of the same street, taken two years apart from each other. The top is from 1972, prior to street renovations. The bottom is from 1974 or 1975, when most renovations were complete. Each set illustrates the way in which the specific issue dealt with in the chapter was dealt with in a particular residential street.

It is not my intent to present the material that follows as an architectural vocabulary that need be applied in its exact form to residential street environments. Rather, the attempt is to present physical elements that can serve as illustrations of possibilities and as pointers of how to address issues of function and use of the residential street.

Some of the physical elements analyzed can be incorporated in new designs of medium density low-rise housing quarters, and some others may suggest renovation possibilities of existing streets. Physical design elements in their defined form should not be applied indiscriminately to any environment; rather, the intent and purpose of any street design must be clarified first, and the physical illustrations herein should be viewed as some of the ways of addressing issues concerning residential streets.
III. PLACE DEFINITION
This section is specifically about parking accommodations on residential streets. Car and pedestrian movement, which also occur in defined areas, will be discussed in detail in the following section and in the chapter on traffic.

Parking of cars is often considered as a burden on the public way. The space that must of necessity be reserved for parking appears to be subtracted from the right of way of moving vehicles; further, such space serves no alternative function. Yet parking one's car on the street is a temporary claim on the public way, and could therefore be considered as part of a transitional zone.

Forbidding signs and rows of parking meters are a typical manner of handling this "problem". In certain parts of Germany and Italy, parking on the sidewalk is an accepted practice, and is also occasionally found in places.
where such a practice is against the law (Fig. 2).

Fig. 3 illustrates how it is possible to maintain a constant parking area without giving the impression that it is space subtracted from the traffic lane. The sidewalk curb is extended to form a limit to the parking place, and bicycle parking racks are provided on the extended area.

The same treatment can be seen in Figs. 4, 5 and 6, where the sidewalk extension along with two short bollards serves as a substitute for a conventional "no parking" - "no standing" sign. Note how there is no policing image evoked, even though the results are better than those a sign can produce. The sidewalk extension also serves as the definition for a pedestrian crossing, which is
elevated to the height of the curb (see also the next section, and Chapter IV, Section 2).

It is possible to use such sidewalk extensions for public or private planting. Note the trellis in Fig. 7, which extends from the house on the left and forms the border, along with the bollard, of one parking space.

A tree or a public lamppost can also be used as area indicators; heavy, removable elements, such as planters, can also be used as limit definers.
In Fig. 9, a number of elements operate simultaneously to define not only parking, but also walking and driving areas. The main characteristic is the variation in pavement, which includes the traditional means of delineating parking: the parking meter and one white line. Note however the appearance of the street. Parking is recognized as a function that belongs on the public way, and it is not simply shoved against the curb. The heavy planter, the bollards, and the discreet delineation of each car space, help considerably in the overall effect. In addition, the lack of curb, though it presents no increased danger to the pedestrian, affords a more unified appearance and integration of pedestrians, parked cars and moving vehicles.

A similar treatment can be seen in Fig. 10, where the pavement patterns are the sole means of definition for parallel parking spaces. Note how the area in front of the entrance of
the house is treated differently to indicate "no parking".

If it is feared that pavement alone is not adequate for restricting a car from parking in a particular area, then additional elements can be used: bollards, planters, lights, trees, etc. In Fig. 11, a tree, a public garbage can and a token fence supplement the pavement definition. In Fig. 12, the use of any of these elements would have been sufficient in maintaining the crossing area free of parked cars.

Parallel parking, where there is adequate street space, is a better utilization of the area required for parking. When there are no parked cars, then this area can be used for children's play or for setting up a temporary vendor stand for the day. However, attention should be paid not to create a "sea of asphalt".

Such parallel parking areas should be broken down in scale by interruption with trees, fences, lights,
benches, etc. Pavement or painting of the street surface are also means of reducing the scale.

One side linear street parking can also be reduced in scale by alternating parking areas from one side of the street to the other. Further discussion regarding this particular technique can be found in Chapter IV, Section 2.

In providing parking places on a residential street, a designer should also consider other modes of vehicular traffic, such as motorcycles and bicycles. The provision of parking facilities for such modes is an important step in recognizing our streets as places for different types of users.

As was mentioned earlier, sidewalk extensions can be used for bicycle parking. Simple posts or racks, such as in Figs. 16 and 17, can be placed at various intervals on the street.
Note how the space available between the bollard and the tree in Fig. 18 cannot, because of its dimensions, be taken over by a car. The same area without racks can be used by one or two motorcycles. Providing such well defined areas upon which a car cannot intrude also affords protection to cycles from being tipped over while a car-driver is trying to park.

Grooved stones can also serve as racks for bicycles, while a motorcycle wheel can rest on the stone itself. The only difficulty of such grooves is that they may be difficult to clean. "I-1" posts can be used for securing the bike with a chain.

Another example of racks is shown in Fig. 20. The short racks have attached to them reinforced wires which can be used to secure a parked bicycle.

When locating parking places for bicycles and cars, it is important
to know the needs of the street's residents. For example, Fig. 21 illustrates an example of a street in the WK where the residents of a particular block did not own automobiles. It was possible, through the design process, to accommodate their particular needs and to provide an area suitable for bicycles. Such communication between residents, authorities and the designer is particularly important in situations in which renovations of existing streets are concerned. An example of the particular concerns that can arise is related in the Appendix, Section 3.
In addition to defining areas for standing vehicles, it is necessary for the designer to think carefully about places for pedestrians on residential streets; places for walking, places for sitting, and places for children's play. Various physical design elements can be employed in order to provide appropriate settings for such activities.

An example of a design element in a typical residential street is the sidewalk curb, used primarily to define and separate areas which the pedestrian may safely use for walking.
A curb can often be substituted with other elements, such as a row of planted trees, bollards, benches, change in pavement material, or any combination of these. The elimination of the curb can occasionally assist in making the street appear less segregated in use. Of course, traffic speed control devices become necessary; some such devices are discussed in Chapter IV, Section 2.
An example of a street which does not employ curbs as a means of defining walking areas can be seen in Fig. 28. Note the use of bollards and trees as barriers. The change in pavement material breaks down the continuity of the driving lane and attempts to indicate that the entire street can be used for walking, and that the pedestrian should be given priority of movement. A similar approach is taken in Fig. 29, where the lack of curb, the bollards, the bicycle parking area, and especially the pavement patterns create the impression of a pedestrian domain on a vehicle traversed street.
Fig. 30 illustrates the use of planters as a boundary definition. Such planters also contribute to the visual pleasure that a pedestrian can get while walking, and they provide an opportunity for variation and visual stimulus; they can assist in alleviating the monotony of a long walk as well.
Variations in the linearity of sidewalk definition provide an opportunity to form sitting or rest spaces along the walk. Note in Fig. 32 how the row of planters is used to define a nook for pedestrians, while the sidewalk extension becomes a border for the parking of cars.

A similar treatment can be seen in Fig. 33, where the parallel parking area ends before the intersection, and the corner is used to create a small park area with a sitting bench.
The use of trees on the sidewalk can contribute greatly in defining such sitting areas. Note that the nook in Fig. 34 is created entirely through the trees placed at either end of a sitting bench, and separated enough from it to define an area. Another "place setting" for pedestrians can be seen in Fig. 35. Had a tree been used at one side of the bench, the area would have been better defined and more pleasant.

Walking on one side of the street and having a place to rest, however, is only part of the pedestrian movement. Crossing from one side of the street to the other is one of the most important aspects of pedestrian movement that a designer should consider. Normally, pedestrian crossings are left up to traffic engineers and the police department. Stop-go traffic lights and painted white lines are the
most common recognition of pedestrians crossing the street. Such means may be quite appropriate in streets that must accommodate a large number of fast-moving cars, but they should not be required in residential streets that receive little through traffic.

It is often the case in the latter that no recognition of crossings is made at all. There usually are no lights and no white lines. Yet it is on infrequent traffic streets that a car may speed up and a child may run into the street at the same time. It is very important to pronounce crossings as often as possible so that the driver may be constantly alert.

A simple example of indicating crossings through pavement can be seen in Figs. 38 and 39, where lighter color bricks (the same as those used for sidewalk pavement) are laid interrupting the normal
street pavement. In Figs. 40 through 43, a similar concept can be observed. Note, however, that in addition to the continuation of pavement from one side of the street to the other, the entire crossing area is elevated a few inches to the height of the sidewalk curb. Thus the crossing becomes a bump that occurs in the middle of the street. Such bumps can control the speed of moving vehicles quite effectively when they occur frequently (see Chapter IV, Section 2).
Cars parked against the curb can often obstruct the view of crossing children to the oncoming driver. It is useful to interrupt the parking area before a pedestrian crossing, so that it is easier for the driver to see beyond the nose of the last car. Extension of the sidewalk to the edge of the parking area allows children preparing to cross the street to be seen more easily.
Additional markers, such as light-posts or trees, are helpful in announcing sidewalk extensions. In Fig. 47 this principle is illustrated. Note the elements employed in the definition of the crossing: the parking area ends and the sidewalk area is extended (this also makes the street appear narrower at the crossing); light color bricks and a white line formed with bricks indicate the area of crossing; two trees and a light-post additionally define the area; the crossing is elevated to the sidewalk height.

Of course all these devices are only parts of solutions, and they cannot succeed by themselves alone. An integral part of dealing with crossings are traffic control elements, which are discussed later. However, it should be remembered that even when crossings are defined, people can always choose an undefined spot to cross the street,
either because it is more convenient, or because they simply feel like changing street sides at a particular moment. It is important in considering renovations of existing streets to first observe movement patterns and determine to the extent possible which spots are most likely to serve as pedestrian crossings. In Fig. 48 an example of "after-effects" is shown. Planters were designed along the curb, and occasional crossings were defined. A certain spot on the street was preferred for crossing, and the bushes in that particular spot were soon trampled by pedestrians. The authorities had to recognize such areas and go back and pave them so that the total appearance of the carefully attended planters could be maintained. Note how the area directly next to a sitting bench was one of the use-defined crossings (Fig. 49).
Large areas that are defined as pedestrian crossings can also be used for making a space where children can play. In Figs. 50 through 52 three such examples can be seen. The extended area that is elevated to the height of the sidewalk curb is clearly pronounced by means of pavement, trees, lightposts, and white lines. Note how parking is restricted from such areas.

Fig. 50

Fig. 51

Fig. 52
In narrow residential streets, intersections provide the most space for children's activities such as street hockey or soccer. It is helpful to recognize intersections that are likely to be used by children, and to be careful to pronounce them as clearly as possible. Note the intersection in Figs. 53 and 54. In addition to the elements mentioned earlier which define the intersection area, a slight shift in the linear direction of the car traffic movement serves as a means to slow the speed of approaching cars.
Another way of providing spaces for children's play on residential streets is to encourage parallel parking. As was mentioned earlier, the space required for three or four cars parked next to each other defines a good size playing area when cars are not parked there.

Note in Fig. 55 how, in the absence of parked cars, the children would have been able to use that reserved space if the curb had been omitted and the parking better incorporated into the sidewalk, or the sidewalk curb had been extended to allow both functions.

As with crossings, it is important to remember that children often choose where they play regardless of definitions provided by the design. It is certainly helpful when the overall approach to the design of the residential street takes play into account. The
delineation of play areas in streets where the speed of cars is left uncontrolled is not sufficient to guarantee safety.

Another technique for definition of play areas is through shifts in the car traffic direction; this will be discussed later in the context of speed control.
IV. TRAFFIC
1. SEGREGATION OF TRAFFIC MODES
   a. Pedestrian Streets

The most extreme way of segregating traffic modes in residential streets is to designate "pedestrian" streets on which cars, and sometimes bicycles, are not allowed at all.

Even though this exclusion of cars guarantees pedestrian safety, the result usually is that the residents of the pedestrian street are inconvenienced because they must park their cars elsewhere, and the street often has a "dead look" to it (see Chapter II, Section 1 for a case in point). It helps considerably to close off only very short streets, or only one block of a longer street, so that both "parking" and "action" are still close at hand.

When signs, posts, or temporary barriers are used to designate the pedestrian street, the result is often a "forbidding" image, a sort of underlying battle between pedestrian and car. Simple devices such as plants or painting can help alleviate this image. Such elements also have the
advantage that they can be easily removed, and the street can then accept car traffic without further modification.

In Fig. 58, a street in Holland is shown where concrete bollards were imbedded into the ground to prevent car traffic during the summertime. It was a major operation to remove the bollards during winter. More temporary barriers could have been used, such as large planters, that would have been easier to move.

If the barrier is intended to be permanent, then it is important to consider the appearance it should have. Trees or other plants can serve as barriers, but can also beautify the environment. Benches or other type seats can also contribute and, like trees, they have multiple uses. Again, when a street is designated as a permanent pedestrian way, the use of furnishings must be considered carefully.
In Fig. 59, a pedestrian only street in Hamburg, Germany is shown. In Fig. 60, a car and pedestrian street, located parallel to the above, clearly indicates that there is little difference in the overall appearance and use of these two streets. Both photographs are taken during a summer day, at a time when children would be expected to use a street intended for them. As a contrast, see Figs. 61 and 62, both taken in the wintertime, which show a similar pedestrian street in Delft, Holland*, where efforts were made to provide pleasant visual stimulation and active use involvement. Note how the differentiation of the pavement, and the central position of trees and lightposts and benches, give the impression of pedestrian scale, but also allow free passage for emergency vehicles.

*The evolution, process, and consequences of this street are discussed in detail in the Appendix, Section 3.
Anytime a street is designated a strictly pedestrian way, a number of safety requirements must be considered: fire trucks must still have access, and emergency vehicles, such as ambulances, need direct-door access. It is therefore critical that the designer carefully consider all safety requirements and consult the appropriate authorities. In a case in which residents act on their own initiative, the authorities should be able not only to define the rules, but also to suggest ways in which both safety and resident wishes can be accommodated.
b. Car and Pedestrian Streets

In the previous chapter, specific ways of defining zones were discussed. In this section, I only want to point out some forms of segregation of pedestrian and vehicular zones, and to discuss some implications of the various degrees to which segregation can occur.

The most well known form of segregating pedestrian from vehicular traffic on streets meant for both is the use of a sidewalk curb. In typical streets, the curb is only a four to six inch difference in elevation that prevents cars from driving on the sidewalk. Through the years, the curb has acquired a psychological importance as a "marker". As children, we have invariably been told "stay on the sidewalk". Yet the reality is that most children will go chasing after a ball regardless of the curb.

A more pronounced difference in elevation, in essence an exaggerated curb, can be seen in Fig. 63, where all housing is set higher than the
car-traversed areas. This solution, however, makes transitions very difficult, and ramps and steps become an unavoidable necessity. In addition, the space requirements for the street width are increased considerably.

In addition to the curb, more substantial means can be used to segregate the pedestrian from the car: a row of trees lining the sidewalk along the curb, parking meters and various traffic signs, lightposts and bollards are all familiar elements in our streets. Though they are not actual barriers for the pedestrian, they reinforce a segregation pattern by obstructing cars from certain areas.

In the absence of a curb, the previous elements can be used as effectively for indicating segregation. In addition, areas strictly delineated for particular use only can achieve the same purpose. For example, the use of strips of grass indicates that cars are not to occupy that area. Paved strips usually indicate pedestrian
movement. Asphalt strips are normal indicators for car traffic. It is possible to use such physical and material differentiations to achieve pleasant results, but when the emphasis lies on segregation alone, the result is often negative because the original attitude in the approach is how to separate rather than how to integrate.
c. Two-Way Traffic

Segregation can also occur in dealing with two-way vehicular traffic. The most common device is the dividing line in the middle of the street, which is recognized as a barrier even though it is only painted on the asphalt.

When a street is wider than two lanes, but the tolerances of width are relatively small with relation to traffic speed, a dividing island in the middle of the street can delineate the limits for two-way vehicular traffic movement.

When an island is used with such a singular purpose, the image of the street can be very unpleasant. Occasionally stoplights can be placed on the island, with two major advantages: that of economy in numbers of lights required, and that of freeing pedestrian zones from signs intended solely for cars. Yet there is a psychological disadvantage for the pedestrian who must cross the same street twice. A common problem that
results from crossing a street with a dividing island, especially when traffic lights are not coordinated for crossing the entire width at once, is that pedestrians often use the island as a sidewalk; the narrowness of such islands is dangerous to pedestrian safety. In Fig. 66, a solution to this latter problem is shown: the island is paved with coarse rubble, which makes it impossible to walk on except at crossings.

If an island must be used, it is better to make it a more pleasant element. A row of trees in the middle of the street can serve the same purpose, and the concrete strip can often be eliminated. In addition, the trees can be used to reduce the visual width of the street. The actual sizes of trees can also relate to a variety of speed movements (see also the chapter on scale).
Where the width of the street permits, the dividing island can also serve as a bike-way.

One of the disadvantages of employing a policy of two-way traffic with no street signs, traffic lights, or dividing islands, is the increased danger of accidents to both pedestrians and automobiles. However, this danger can be offset through the use of speed control devices (see next section) that tend to reduce the maximum attainable speeds. On the other hand, eliminating stop lights and signs can avoid unnecessary delay at intersections, and the average travel time can be maintained*. In addition, the overall appearance of the street tends to point more towards an integrated environment for both car and pedestrian traffic.

*See Appendix, Section 3, for one example.
In attempting to create residential street environments that are both pleasant and safe for their residents, it is important to control the natural dominance of the car, which arises primarily from the incompatibility of its speed with the speed of a pedestrian.

The most common device for speed control, apart from traffic signs, is a bump that occurs in the area where cars drive. Such bumps disrupt the smoothness of the ride, and force the driver to slow down. When placed frequently along the length of a street, they eliminate the opportunity for a car to pick up speed. An approximate distance of two hundred feet is sufficient for that purpose.

Bumps can have the simple form indicated in Figs. 69 and 70, but they can also serve additional purposes.
Fig. 71 and 72 show the use of the bump for slowing traffic at a pedestrian crossing. As a car approaches, its driver can see a change in the pavement that announces the bump. White bricks formally indicate the pedestrian crossing, and these bricks can be easily perceived from a distance. The actual pavement pattern of the bump is the same as that of the sidewalk, an additional pointer to the crossing.

It is possible to announce bumps to the approaching driver in a variety of ways. Though a simple traffic sign may suffice as warning, it may also be unnecessary. Traffic signs are in general forced on environments, and they evoke an image of "policing".

Differentiation of pavement, either as strips, white lines or larger areas, suffices for announcement. A driver who has once gone fast over a bump is not likely to repeat this act because of the abrupt shock. The particular design characteristics
of a bump, such as elevation, width, roughness of pavement, and frequency of occurrence determine the degree of speed control. In driving over many bumps of the WK, for example, I found that even a maximum speed of ten miles per hour was too high for maintaining a comfortable and smooth ride. Certainly, bumps can be designed for both higher and lower speeds.

A bump can also be announced by trees or other forms of planting, by a bollard, or a public lightpost. The latter is very effective during the night, when reduced visibility makes it difficult to perceive small differentiations in pavement.
If snow is a common occurrence, trees or other special elements that are visible all year round can ensure that the driver is forwarned at all times.

Another speed control device that can be seen in Figs. 76 and 78, is an apparent narrowing of the width of the street. Even though the actual width of the driving lane remains constant, the visual impression is one of narrower width, especially in the absence of parked cars.

The same effect can be achieved by actually imposing obstacles that narrow the width of the driving lane at critical points such as pedestrian crossings or intersections, regardless of whether a curb defines the pedestrian area. Such obstacles can
be benches, bicycle racks, bollards, trees, plants, sidewalk curb extensions, etc.

Note in Fig. 80 how a tree is planted at the furthermost point of the intersection corner.
Fig. 82 shows a bump, bollards, a lightpost, and trees used together to give an impression of a narrow passage. In addition another device is used in this particular instance to control the speed of the driver who is not familiar with the environment: the street gives the impression of a dead-end street, while in reality it turns the corner. This impression, as can be seen on the plan, is created by the position of parking and the particular pavement characteristics.
When the entire length of a street can be seen by a driver, the temptation to pick up a higher speed is very strong. In order to control the acceleration and to encourage lower average speeds on long linear residential streets, it is helpful to break an extended perception of distance and to organize the street in smaller sections.

A useful technique for this is to create a shift in the travelling direction where the width of the street permits. This can be done in a variety of ways. Parking can alternate from one side of the street to the other, while at the shifting points actual barriers can occur, such as trees, bicycle racks, benches, etc. The shift can occur either along the length of one block (Fig. 83) or at intersections (Fig. 84 shows a + intersection and Fig. 85 a T intersection).
The point of directional shift affords the opportunity to create, with the appropriate use of furnishings, a "place" in the middle of the street. In addition, planting can be used to obstruct the view of the entire street.
Fig. 88 shows another instance where frequent directional shifts occur on a wider street that can accommodate parking on both sides of the street.

In the above examples, the sidewalk area remains constant along the length of the street. It is also possible to cause a shift by varying the size of the sidewalk, whether or not a curb is present.

Short double shifts can also be used to form places off the driving lane that can be used as play areas or where a neighborhood store may display merchandise without subtracting from the walking area.
Another means of suggesting a shift in the driving direction is pavement patterns. In Figs. 89, 90, and 91 examples are shown in which breaks in the pavement suggest a shift, whereas in actuality there is enough width to maintain a straight line of travel.

This device is particularly effective visually, because it presents a stronger association to the pedestrian, while not obstructing vehicular movement.
In Fig. 92 a break in the pavement is employed in a different manner: the sidewalk surface is continued directly through the intersection. With the addition of a bump, which results from the elevated sidewalk surface, the pedestrian and the cross street are given clear priority, and a stop sign becomes unnecessary.

Breaks in the pavement or large paved areas can serve not only to establish priorities, but also to strongly emphasize an approaching intersection. In Fig. 93, the extended area of pavement indicates an incoming street in the T intersection. As the driver approaches, the bench on the corner emphasizes the crossing and the general likelihood of pedestrian presence.
In most typical streets, the corners of intersections are designed to allow cars to take a turn at relatively high speeds, by providing high clearances of curvature. When speed controls are desirable, it is preferable to make the corners narrower for turns. This involves the extension of the corner into the driving lane, sharper turning angles, and occasional obstacles.
Fig. 96 illustrates the corner of a residential street in Athens, where a small selling pavillion stands. In the past few years it was hit several times by speeding drivers that took the turn too fast. The result was that the owner of the pavillion was forced to imbed concrete posts in the sidewalk to protect the stand from cars.

By designing sharper corners and using bollards at the critical points, it is possible to reduce the traffic speed. Such bollards must be able to withstand impact. In the WK, for example, where corners are often treated in this manner (Fig. 97), bollards occasionally had to be replaced because they were bent by the impact force.
The extension of a corner can also serve as a substitute for the typical "no parking" signs that are common near intersections. By ensuring that parking will end before the intersection, a clearer visibility of the corner is possible, and crossing children are easier to see.

An extended corner can also form a "place" with the use of planters, trees, and benches (see Fig. 99).

In general, cross intersections that allow a street to continue in a straight line after crossing another one should be avoided. It is better to offset a street at intersection points, so that drivers must shift their direction slightly and will therefore slow down.
Another technique for dealing with corners is to present an ambivalent image to the driver of the directional possibilities open to him (Fig. 100). Even though a resident of the area will soon know the actual feasible directions of movement, transient drivers will nonetheless tend to reduce their speed.

In Fig. 101, a number of elements are combined to control traffic speed at the intersection:
- The entire intersection is a bump.
- The sidewalk pavement continues through the intersection.
- The pedestrian crossing is emphasized with white bricks.
- Parking ends before the corner.
- Bollards are used as markers.
- The corners are extended and a smooth turning curve is not apparent.
V. SCALE
1. Definition of Small Scale Spaces

In creating streets that are pleasant environments for people, it is important to consider the scale of the pedestrian on the street.

Defining small spaces contributes to the intimate scale of the street and integrates people with the environment they move in. This definition can be achieved in many ways.

A very strong delineation of such a small scale space within the larger context of the street can be achieved by actually connecting the two sides of the street; the most extreme form of such connection is to actually build over the street.

A "crossing over" from side to side can be used to provide access to the second storey of housing or to directly connect two upper storey homes, as is often done in Greek villages and towns. Figs. 102 and 103 illustrate an example from the main residential street of a Greek village.
village. In the situation illustrated in these figures, the tightness of available space made it necessary to use part of the street for private access to the second storey on both sides, while still maintaining free passage for pedestrians underneath. In addition to the functional use of the bridge, a sense of enclosure is created in the street: the continuous linear path is redefined at intervals as a three-dimensional space. The volume that is created underneath, even though it is still for general use, encourages a stronger private identification. In this space, water flasks are left to cool in the shade, and the area is maintained privately, since its association with the house is quite strong.
Even a simple formal gesture, such as an arch or an open gateway, can contribute greatly to the sense of an intimate space in the public zone.

Where shortage of space is high, or where a continuous facade must be maintained, it is possible to build housing over the public street. For example, in the WK there is a main canal which forms one of the borders of the neighborhood quarter, and which is a desired spot for housing. In order to allow cross access but still maximize the housing that fronts the canal, homes are often built over the streets (Fig. 107). Of course, this is the
most extreme form of enclosure, and it also constitutes a permanent characteristic of the environment.

Fig. 108 illustrates a similar case, where the public way is actually formed by the volumes created under the elevated houses, in a recent housing development in Helmond, Holland.

It is possible to create intimate enclosures between the sides of a street by less extreme and less permanent means, such as a trellis with growing plants. Often this requires no more than residents' initiative, though a trellis, or just ropes, provided by the designer and/or the authorities can spark such private initiative.
Similarly, an intimate volume can be created in the street by planting trees either on both sides of the street, with foliage extending to form a canopy, or in a middle row, again with extended foliage. Evergreens mixed with deciduous trees make it possible to maintain the quality of environment throughout the year.

Intimate scale can also be achieved by defining volumes on one side of the street only. A continuous arcade affords weather protection for pedestrians and provides an opportunity for multiple use of the space underneath, such as temporary flower markets, a store display, etc. This space, though private, can be used
publicly and it creates a nice transition between the public zone and the private zone.

A less formal arcade can be created with canopies, both temporary and permanent, that extend beyond the edge of the building into the public zone. The volumes that are defined in this manner give a stronger feeling of transition by allowing the private zone to influence and to partially control part of the public zone.

Canopies and awnings help break down the scale of a wide sidewalk, and they form small niches of intimate space on a more human scale; thus they afford variation and often relieve the monotony of the walk.
Fig. 114 illustrates the use of an awning along with a store display board which form an interesting space in front of the store for the pedestrians on the walk. This device can be used to form temporary transitional spaces in front of small stores in residential neighborhoods. In the daytime, the space under the awning can accommodate goods for display (such as fruits and vegetables), a chair for the storekeeper, etc.; in the evening, the awning can be withdrawn.
It is possible to maintain an intimate space of enclosure on the sidewalk simply by planting trees whose foliage extends to form a canopy towards the house, as can be seen in Fig. 116.

Enclosure, however, is only one of a variety of ways of defining small scale spaces. Intimacy on a street can be achieved with small use areas that relate to a particular function, or that provide useful niches.

Formal bicycle racks can easily be placed so that an intimate area is defined near the home, or a frequently used neighborhood store.
Fig. 118 illustrates such an area in a busy residential and shopping street. The bicycle racks are surrounded with square wooden posts on three sides; the whole cluster not only provides parking, but it also controls the speed of moving cars and it defines an intimate area where people can sit on the posts or rest by placing their bundles on the frame.

A similar solution can be seen in Fig. 119, where the area for parking extends across three homes; the bicycle parking is defined with round wooden posts, and the bench forms another boundary to the area. Rough, unplaned wood can by its nature (grain, color, texture) be a warm material and it can give a feeling of intimacy. Also, the manner in which the posts are put together helps put forward a "homey" image. Note in addition the pavement definition.
Figs. 120, 121, and 122 show further examples of the same way of creating small intimate areas on residential streets, using fence posts, benches, racks, and pavement patterns.

The space is front of a home can provide numerous opportunities for small area definitions. Locating trees and planters in the public zone, while associating them with a particular home by careful positioning and sizing, encourages an extension of the private domain and creates an area that feels highly personalized to the pedestrian.
The same effect can be achieved by extending a trellis from the walls of a house to define an entry or a parking space.

In Fig. 124, such a trellis is shown. It stands on the public zone in front of the home, but it defines a space which is used privately. Of course, it is necessary in such cases to consider carefully the process that allows and encourages such initiatives. In the example shown here, the municipal authority established the maximum allowable extent of the trellis so that public utility cables located under the street would not be disturbed by plant roots, and circulated a pamphlet to the residents in which trellis and other planting ideas were suggested (see Appendix, Section 2).
An intimate area in front of a home can be delineated in much simpler ways as well. Two barrels with growing plants, a climbing pergola, or a simple post can achieve a similar effect in terms of personalized scale definitions.
The use of pavement patterns in combination with plants, lightposts, bike racks, etc. helps considerably in the definition of small intimate spaces.

In Fig. 131, the painted stonework, the curvature of the steps, the wall which extends from the house to form a seat-high fence, and the open entrance gate are all elements that contribute to the intimate appearance of the public zone, by involving the passer-by in a small scale area.
2. DIMENSIONS

The overall dimensions of a street determine, to a large extent, how intimate the environment looks. Fairly narrow, winding streets break up the monotony of long linear dimensions and provide an opportunity for nooks and special places along the way. Such streets also afford better control of the public zone by the private zone, simply by encouraging supervision of areas more directly associated with homes. In many European towns, the intimacy of public streets can be attributed to their narrow width and winding pattern.
Special treatment of the corners that are created in such streets, with color, pavement, flowers, benches, etc., can help identify the street as composed of separate but connected areas.

A winding effect, without actually shifting the street itself, can also be achieved on a street by simply varying parking positions, sidewalk dimensions, and paving patterns (see Chapter IV, Section 2). Other winding effects can be created through the play of vertical housing walls, variations between first and second storeys, offsetting of entrances, etc.
Trees are especially useful in breaking up long linear dimensions, and staggering can be used to suggest a non-linear effect. In considering the dimensions that affect the scale of a street, it is important to address the height of trees and lightposts. Trees need to relate both to the scale of the house, but also to the height of the pedestrian. When the lower branches of trees lining the street come as low as five feet, there is a much stronger association to the pedestrian.
Note in Fig. 138 how the child is dwarfed by the towering tree-trunk, which continues much higher than even the housing.

For streets with higher buildings, it is possible to either alternate high with low trees, or preferably, to use trees that in their height relate to the building, but whose branches begin low, near the height of the pedestrian.

In terms of public lightposts, the choice should also be made carefully to relate the fixtures both to the housing and to the pedestrian. Cold, impersonal lightposts that best suit the freeways should not be used for housing areas; rather, the appropriate scale and appearance
should be considered. Low posts with wide spread fixtures can often achieve as good lighting as tall freeway-type lights, especially since in most residential areas additional lighting is provided through the windows and doors of peoples' homes.

Attention should be taken to avoid creating a hindrance to residents with public lights that shine into their windows when they are asleep.
Variations in scale, frequency of placement, and fixture intensity are all ways of pointing out special places, such as pedestrian crossings or bike ways.
3. WARMTH

A street that is warm, intimate, and inviting is also a place where there are things to look at, to touch, to experience, and to enjoy.

Plants are one of the most versatile materials to use in the street, because of their enormous potential in creating different scales, their versatility in color and texture, and their ability to evoke different warmth images.

A designer can, through clues and suggestions, encourage the use of plants by the residents. Private care of greenery usually results in a nicer, better kept street. Though it is not possible to expect designers to ensure the use of planting, it is helpful when they suggest different plants and ways of taking care of them.

In the WK, the municipal authority gave options to the residents to start private gardens in the
public zone, suggested ways of doing it (see Appendix, Section 3), and provided the first plants free to whoever wanted them. A tree planting day was organized, and the entire community became involved.

In the series of Figs. 143 to 148, some of the results in the WK are shown. The range is extensive, and involves anything from a simple window display of indoor plants, to climbing vines, to one foot wide private flower gardens, to planters and trees. Again, it is the process of encouragement and the support that municipal departments can provide rather than careful design that often results in such warm and pleasant places.

Another way of making an intimate street is through the use of pavement. Throughout this thesis, constant references have been made to the various effects that pavement can have on the environment.
A small amount of care in pavement design can go a long way in providing warmth in a public space. True, the monetary costs are often high, but the benefits can be even higher. A great deal of money is currently spent on streets—all that is necessary is to consider carefully what benefits that money can bring.

In Figs. 150 to 161, a small sample of pavement patterns is shown (from the U.S., W. Germany, N. Holland, the WK, and Greece). Only one of the examples (Fig. 157) has a long cultural history. All the rest are recent attempts to make a warm place for people.
VI. USE
Any urban residential street needs to accommodate a number of essential public utilities, such as street signs, fire hydrants, and lightposts, and these utilities have a major influence on the overall appearance and use of the street.

Bus stops in neighborhoods that are serviced by public transportation, for example, usually occur every three to five residential blocks. A common way of announcing a bus stop is a simple traffic sign, often combined with a "no parking" regulation. A sign, however, can afford no protection from the rain, a strong wind, or a very sunny day. There are a number of bus stop stands around the world that are very pleasant and comfortable waiting places. A four-post stand with a rain-proof roof is a far more useful element than a metal sign. Glass or durable
plastic can be used not only for enclosure and weather protection, but also as a place to post information on bus routes and time schedules. The addition of a bench can help ease the waiting time. A tree and a trash can are smaller ways of enhancing the stand. Of course, not every bus stop need have the same treatment—but something in addition to a "Bus Stop-No Parking" sign is desirable, even if it only consists of essential information to the riders. In Fig. 162, a minor point is illustrated: trolleys, buses, and tramways are good places for advertisement. Perhaps part of the money that is needed for stands can be collected this way. It is important, however, to carefully consider the forms of such advertisement, so that they can also contribute to a visual stimulation and a pleasant, colorful environment. Mailboxes and phonebooths are also utility elements that occur in residential
streets. Placing a booth or a mailbox near bus stops contributes to the use of the environment. Again, both of the above afford possibilities for advertisement or for colorful treatment. In Fig. 164, three phone booths from Lübeck, Germany are shown. They are decorated in bright colors, and telephoning instructions are not only clear, but also very pleasant to the eye.

Another place where a similarly pleasant effect can be created is on construction site fences. There is a utility requirement to provide a safe pedestrian walkway, which is usually very grim, though functional. Fig. 165 shows the construction fence for a site that belongs to a Danish bank; the fence was used to promote public relations by initiating a painting competition for school children in the neighborhood. The final result is extremely pleasant and
colorful. A sensitive touch is the formal recognition of peeping holes carved in painted figures (including one for a dog!): a construction site is always a spectacle for people.

Public lights are another necessary element of residential streets. They were briefly discussed in the previous chapters. Their primary function is to ensure public safety in the evening, but they can serve a number of other purposes: they can be used to create an intimate scale, and to define a place. In Fig. 167 the lightpost is one of the elements used, along with a planter, a widening of the sidewalk, and variation in pavement, to announce a pedestrian crossing and to form a pleasant variation on the sidewalk.
A similar treatment can be seen in Fig. 168, where the lightpost is one of the elements used to announce a speed control bump (see also Chapter IV, Section 2).

Lightposts are a convenient post for affixing street signs, bus stop signs, parking information and garbage receptacles. Of course, careful design can alleviate some possibility of confusion that may arise from too much information*. In the evening, all such signs are far more visible than if they only stood on metal posts, due to the illumination from the lightpost.

---

*There is one study done on this topic, by the office of William Lam Associates, Lighting Consultants (Cambridge, Massachusetts).
Fig. 170 illustrates Easter Sunday flower decorations that were hung on a number of lightposts in Santa Cruz, California.

Unplanned, yet frequent, informal uses of lightposts are the temporary securing of bicycles and the posting of advertisements, announcements, etc.

In Greece it is common practice to use public posts for house rental and sale boards, and for announcements of deaths in the neighborhood. When someone is looking for an apartment in a particular area, all he often needs to do is check the lightposts of the streets (along with housing entrances), and he will find standard forms with all pertinent information on available house rentals.

Relating public utility elements is often a difficult task in coordination of large bureaucracies.
It may not always be possible to find solutions that incorporate the transit authorities, the U.S. Post Office, and the Bell Telephone system, but the designer should at least consider the possibilities that are open, and the municipal authorities that tend residential streets ought to be aware of the positive effects of placing such elements together. It should certainly be possible to avoid gross mistakes such as shown in Fig. 172, where the lightpost was placed on the sidewalk, effectively blocking the entrance to an apartment building.

Careful design does not imply that the exact use of an element will be always foreseen. A fire hydrant will often be used by children as a toy, and a parking meter will also occasionally serve as an impromptu display stand. Yet it is such spontaneous use that should have the opportunity to occur if our streets are to be an active, enjoyable place in our living environment.
In addition to the necessary public utilities, it is important to consider what other elements can contribute to the making of a pleasant street environment and can stimulate and encourage its multiple use.

Small neighborhood stores provide a considerable degree of convenience to the residents and should be encouraged. Their survival is difficult when they must compete with large shopping centers, but a designer can at least make places that accommodate, display, and encourage little stores.

Street corners tend to be more active places than the middle of a block. Encouraging stores in corners will give them the advantage of more exposure.
"T" intersections also afford exposure areas. Figs. 176 and 177 show a store located on a "T" corner. The pavement in front of the store serves as announcement of both the intersection and the shop. The parking area ends before the store, and this ensures a free curb in front of it. The sidewalk is also extended to provide display space for the merchandize. In Fig. 178, another example of ample display area is shown.
In Chapter IV, Section 2, speed control devices were discussed. A shift in the direction of traffic can also be used to channel car movement so that a store becomes most visible to the driver (Fig. 179).

Arcades can create an inviting environment to the pedestrian, and also afford display areas that are safe from the vagaries of the weather.
Corners for stores can be created by allowing little nooks to happen along the sidewalk. A protrusion from a building can also be effective in emphasizing a particular shop.

Fig. 183 illustrates the way in which a number of shops in Hamburg, Germany attempted to attract customers. The stores are located on a short pedestrian street which ends on cross streets on both sides. The stores commissioned a wall painting to be done in bright colors on the facades of residences on the less frequenced cross street. The result is a very pleasant street environment. Recently, this kind of house facade painting has spread widely in Hamburg; owners or rentors of homes which have a blank wall side often commission similar paintings, which brighten up considerably old residential neighborhoods.
Making a "place" in front of a store contributes greatly not only to the success of the store, but also to the enjoyment of passers-by. Planters, trees, and benches are all elements that can be used for this. In Fig. 184, a large planter is used both as a speed control device, and also as a "place former". It opens toward the corner shop, while leaving a space for pedestrians to walk. Contrast this with the appearance of the kiosk in Fig. 185, where no potential for multiple use of a generous corner area exists.

Fig. 186 illustrates the use of a corner arcade by three vendors on a commercial-residential street in Athens. The space provided is adequate for all vendors as well as hurrying pedestrians. Though no particular attention has been paid to the space, the columns create some intimacy of space where a vendor can set up for the day.
Small stores and vendor stands contribute to the use of a residential street not only because they provide articles that residents need on the spur of the moment, such as newspapers, cigarettes, etc., but also because they involve the passers-by (Fig. 188) on a social interaction level that can add a great deal to the warmth of a neighborhood.

The designer should keep in mind that residential streets are also places where a weekly vegetable market may take place, and where a fund-raising or political campaign may be run.
Larger congregations of people should also have a chance to occur on the street. Fig. 191 shows a group of youths who started playing music, singing, and dancing on a Californian street as part of the Easter festivities. A seat-high wall surrounding a large planter on a sidewalk extension provided a sufficient setting for their activity.

Seats and benches can be located on the street for more private gatherings, and they can encourage small informal get-togethers. Figs. 192 and 193 show a corner in the WK: the addition of the bench on an extended sidewalk area in Fig. 193 help redefine that corner in a more pleasant, inviting way.
In a number of residential settings, it is common for the people to sit on chairs along the sidewalk and observe the happenings on their street. Regardless of the existing behavioral patterns, a designer's choice can provide a setting that encourages such activities and defines areas where they might occur. In Fig. 196, a group of women in an Austrian village are shown. A public bench is provided for sitting on, and it serves as the center of leisure. When the bench is not enough, people bring their own chairs along.
Windowsills at seat height are also good places for sitting, especially when they define a place that can be temporarily claimed. Such places can also be formed with seat-high planters, where the sill is wide enough for a person. In Fig. 198, there is also a choice of direction towards which to face, since the planter walls surround four sides of the flowers. Similarly, benches without back support can provide the same options for direction. In Fig. 199, two-directional benches are used to define the border of an empty lot that has been turned into a playground. Adults accompanying children have a choice of where to face.
Though round benches can give the maximum flexibility in which way to face, they afford little chance to associate between people sitting next to each other. Note, however, in Fig. 200 how the tree in the middle of the round bench assists in forming a very special spot on the street. Of course, such spots should be created in places where "action" is likely to occur, as for example near stores, bus stops, or children's playgrounds.

A sense of cosiness and privacy can be achieved by placing benches in nooks or against walls; people can then still be in the public zone, but can also maintain a stronger sense of territoriality.
Figs. 203 and 204 illustrate two more types of wooden benches. In Fig. 203 sitting is only mildly suggested as a use function. A store could also use the same surface for display, and a flower vendor can set up shop for a day. Fig. 204 shows a more singular use bench.

In Fig. 205, the bench is used as one of the many speed control devices on a WK corner. A slightly less rigid form would have been more pleasant to sit on. Nonetheless, note how the pavement pattern defines territoriality in the absence of a curb.
In Fig. 206, a number of public use elements are provided. Bike racks and a stone bump define the street as pedestrian. The bump is also a fun place for very young children to climb. A tree gives shade in the summertime and a wooden play structure has some seats on its edge. A two-directional bench is also provided.

Public amenities that are carefully designed to associate with the needs of the residents and to stimulate the use of the public space give a strong sense of community by providing a chance for spontaneous interaction. A vocabulary of street furnishings can be a useful designer's tool.
VII. PERSONALIZATION
On a street where many homes stand, it is often important to the residents to be able to identify their home. It is more a psychological need rather than a physical necessity, since house numbers are adequate for singling out one particular house.

There are a number of things a designer and the municipality can do to both provide and encourage personalization and identification on a residential street. In Appendix, Sections 2 and 3, some possibilities are discussed as they arise from the actual experience in the WK. In the second section of this chapter a short discussion of a design approach that encourages personalization is included. In this section I would like to briefly mention some actual design elements that can be used to reinforce identification of entrances and of spaces on the street that can be temporarily claimed by and identified with a resident.
The front door stoop is a common way of singling out an entrance. In Holland, the property line of many houses starts at the actual wall facade, and stoops are "tolerated" impositions on the public way. Municipal authorities have the legal right to request the removal of a stoop, but a long tradition and occasional law-suits have established a pattern, whereby both private maintenance is required, and city authorities retain final rights, but efforts are made to maintain a balance of interests. When utility work needs to be done on the street, the authorities are careful not to intrude on private stoops.

Fig. 208 illustrates a way in which public planting can recognize an individual entry by means of the way the planter areas are arranged.
A similar treatment can be seen in Fig. 209, where the placement of two trees and a lightpost reflect an archway used as a common entry for a number of houses. Note how the street bump, the change in pavement, and the parking area definition all contribute to the marking of the area in front of the archway.

An area in front of a house door can be defined by an extension of a sidewalk which also serves as a means of indicating a "no parking" area. In Fig. 210, the sidewalk extension is further emphasized with bollards which, in this case, are an additional guarantee of "no parking".

Similar sidewalk extensions can be used for bicycle parking, for a public bench, for a special tree, or for small children's play that can be easily supervised through the open door or from behind a window.
A bollard can be used to single out an entry, with area definition created by variations in the pavement. Such pavement definition and positioning of bollards are useful in indicating to a driver all the places from which a child might suddenly emerge. Figs. 212 and 213 illustrate the use of one bollard to indicate either a single entry, or two doors side by side. Note in Fig. 213 how the positioning of the bollard and the climbing ivy help create a pleasant common space for the two home entrances.

A similar treatment can be seen in Fig. 215, where small footpaths over the sidewalk drainage channel serve as entry markers.
In Fig. 216, a lightpost and a bollard set approximately 3 feet apart, are used for temporary parking of a bicycle, which can also set a partial limit to how close a football will get to the house door when children set up their field on the street.

Another example of pavement used to define an entry is shown in Fig. 217. Note the acknowledgement of the corner placement of the door.

Note in Fig. 218 the height of the bollard used to both define and protect a corner entrance: true, it needs to be sturdy so that actual protection from cars turning the corner can be afforded, but it could have been squatter and wider so that it could also serve as a temporary seat. A flat top would have been useful for setting a plant or a pile of books on it.
An entry can also be defined with less elaborate means than paving patterns of laid brick. In Greek villages, it is common practice to outline stones on the public way with whitewash, and to define the private area around entries with solid whitewash.

Mailboxes, nameplates and house numbers are also additional markers.

Fig. 219 shows a tree located exactly in between two neighboring doors; the small area it creates serves as the marker of the two entrances. Trees used to define entries can give a personalized image, and they afford variety through seasonal changes.

Small private gardens put on the sidewalk also give a sense of entry identification, which is highly personalized.
Note in Fig. 221 the use of a bollard and a heavy planter as identification elements, which at certain times of the day are almost camouflaged by a great amount of equipment that belongs to the two adjacent households.

A doormat, a lantern and a plant are also strong identifying elements, provided not by a designer, but by an individual resident. They are easy to replace, while the elements mentioned earlier are more permanent. It is worth considering street furnishings that a designer can provide, but that a resident can easily change or remove, such as heavy planters, blocks of wood for seats or for children's play, large round stones, etc.
As a final note on identification, and specifically on entrance definitions, I would like to briefly show a few examples of entrances to private common spaces, or to secondary residential streets that serve a number of homes. Such definitions, though they do not exclude the general public, identify more closely a group of homes as a neighborhood and afford a better supervision of the public way by the bordering homes.
One of the most elaborate definitions is the use of a door or gate (see also Chapter V, Section 1). Note in Figs. 224 and 225 how a small door on the facade of a building leads to a very intimate public street. The same principle is illustrated in Figs. 226 to 228.
A similar, yet less strongly pronounced effect, can be achieved through the use of archways and passages that lead to a private/public common space.

In Fig. 229 an example of such a passage is shown from Lübeck, Germany, where an entire section of the city is organized in this manner. Such streets and court-yards permit very long and deep residential blocks.

A similar example can be seen in Figs. 231 and 232 from Switzerland and Austria, respectively, where archways on the main street lead to secondary through streets or to dead end streets.
In Austria, this courtyard system arose from the need for attached buildings for each household and from allowing access from the fields to the main street while maintaining the impression of row houses on it (Fig. 233).

Similar archways are used in large residential projects; the need for identification increases when the number of homes each gateway serves is quite large. Note the painting of gateways in Figs. 235 and 236 from a large housing project in West Germany.
A milder form than archways for defining common private/public space is the use of courtyards, pathways, and trees, as can be seen in Figs. 237 through 240. In all examples shown here, the public way that is created is not owned by one household alone. It is rather a public space controlled by a number of residents, and a passer-by is free to wander. Nonetheless, the degree of definition and identification is strong enough to convey feelings of "not belonging" to anyone who does not, through home or acquaintance, have a right to these spaces.
Both the designer and the municipal authorities should provide some flexibility in the design, and in the laws and regulations, that can allow residents to use the public zone for private activities. Such flexibility, and the use clues that can accompany it, contribute tremendously to the making of a "personalized street".
One example of the results of flexibility that was provided by the municipality in the WK is shown in Figs. 241 through 243. In the structure of the Dutch government, there exist agencies which have the authority to determine what can or cannot be done to the house facades by the individual residents. A change in the strict rules that these agencies outline recently permitted house facade painting. Funds were allocated for house renovations, and various architecture students started a "house painting" movement. The result is a drastic change from dark, grim rows of housing to colorful, pleasant, and personalized facades. More details on the total process that made this possible can be found in the Appendix, Section 2. Note how in Fig. 242 the individual house is pronounced by color variations; in Fig. 243, the paint color varies from ground to second storey in a two family house.
One of the most important effects in the WK, however, was a result of the general guidelines by which the street renovation program was conducted.

One of the attitudes adopted by the municipal urban planning section, was to reinforce the use of plants. During meetings with the residents, various designs were shown to them which indicated possibilities for small private gardens on the street. A booklet with plant information was distributed among the residents, and the first plants to be planted by the residents were paid for with municipal funds. In addition, the municipality organized a tree planting festival, during which most residents were involved in planting trees provided by the authorities on their own street. Also, certain guidelines with respect to allowable sizes of gardens were specified, but a
considerable amount of freedom was provided within those guidelines. When the bricklayers were at work repaving the streets, a resident often requested a particular setup of the bricks for his own garden. The variety of results can be seen in Figs. 244 through 252. The trellis on Fig. 244 was one of the elements that were incorporated at the designer's suggestion. The same is true for the trellis and bench in Fig. 252. Another important aspect of this process was that the authorities gave some confidence to the residents such that, within the guidelines, they were allowed at any time to change the particular layout of their gardens. Other basic guidelines set in the design process are briefly discussed in the Appendix.
In Figs. 253 and 254 the use of a wooden post is illustrated. Though it is set in the public area by the designer, it encourages primarily private use and defines the extent of the private domain.

The location of public planters, as has been mentioned in previous chapters, is a useful device to encourage private use by directly associating the planter area with a particular home that is more likely to assume a partial ownership and that will therefore take care of it.
Figs. 256 and 257 illustrate how the variation in pavement can encourage the claim of a particular area by an individual home. In both cases, the private objects occupy only that small area of pavement directly associated with the home.

Trees can greatly contribute to private use, as has been seen with all other design issues discussed in this thesis. In Fig. 258 it can be seen how the trees in the middle of the street create an intimate, shaded spot to which residents can bring a chair to sit on.
As a last comment on private use, it should be remembered that balconies, even token ones, can provide a great opportunity for personalization, and they can contribute to the active, involved appearance of a residential street.
In this section I do not intend to talk about what a designer or a municipal official can do to encourage the creation of an intimate, personalized street. Rather, I would like to show what individual residents have designed on their own initiative. In the final analysis, it is the residents of a street who can give the most caring, personalized, intimate touches to it; and it is the accumulation of such little gestures which play a crucial role in defining the street atmosphere.

Personalized touches are sometimes very small. They can consist of as simple an element as a mail basket that is hung in front of the door, or an embroidered or lace curtain, a decorated doorknob, a doorbell that lights up, a special door, or a beautiful window shutter.
Windows are a good place for show, and people often use them for displaying little bottle collections, flowers, and other things they value and take pride in.

In the WK, many residents have put a great deal of effort in their house numbers. Even though house numbers are provided for all residences in the neighborhood, many people substitute for them (or simply add) a colorful number they have made or bought in a store. Name plates also appear as something special that represents a particular person or family.
One of the nicest resident designed elements that I saw in the WK was a small private gate that was made by an old bicycle wheel and a simple wooden frame painted white.

A few flowerpots on the front steps, or recycled coca-cola and vegetable cartons can be used to make a small private garden in the front of a house, where the space is usually tight in urban residential streets.

In Los Angeles, I often saw stairs with tiled or multi-colored risers that added a lot to the overall colorfulness of the street and indicated what people behind the walls might like.

Unused doors provide a great opportunity for "wild" things. The most elaborate unused door I have seen stands on a rather ugly street in Sant Cruz (Fig. 271).
Even when residents do not design or present something of theirs to the street, they can still find ways to show their feelings about their home and their environment. In Fig. 272, the top corner of a home in Germany is shown. The building is very old, of a time when wood carving was one of many ways of giving a lot of care to the detailed appearance of homes. The residents of this particular home take great care to keep up and maintain this special corner, by always painting it in bright, joyful colors.

In Fig. 273, a common entry to two second storey homes is shown. The staircase starts from the public street. Note how the banister starts only at the second step, which gives a small, inviting gesture to the passers-by on the street. The openness of the banister also helps in associating the staircase with the public way.
A similar gesture is shown in Fig. 274. Note how inviting the yard wall is, simply because of its height and of the way the gate is defined. The height of the niche is just right for sitting, and it can also serve as a place to rest bundles or to put a flowerpot.

Balconies are also places where residents, especially of apartment buildings, have a chance to present an individual image to the world.

The last resident-made design I would like to show is Fig. 276, a really lovely front yard that has been created on a tight space out of very small, inexpensive pieces. There are hardly words to describe the amount of care that has been put into this garden.
Again, this section has given only a taste of what residents can contribute. The designer's responsibility is to create a street environment that will at least support, if not stimulate, similar personalization.

There was an old man in Delft who was very proud of his home. "Number 17 is my house," he said to me. "You should take a picture of it." So I did.
VIII. CONCLUSION
In ending this thesis, it is difficult to arrive at "conclusions". The material that has been presented is only the beginning of a research that must go on in the years to come; it is the first attempt at organizing my thoughts and feelings about residential streets; it is the basis for a designers' workbook that can suggest ways of dealing with the complexity of the street. There are more components to be covered, more thoughts to put down, more environments to look at, more designs to be done—and this will take time.

"Our streets are places for people." That was the point to be made in this thesis. We must now take it from there: add, observe, design, think, contribute, and most of all care about our streets.

For, the street is a place for living.
APPENDIX
1. WESTERKWARTIER: GENERAL INFORMATION

a. History

The city of Delft is situated in the South Holland province approximately 60 km SW of Amsterdam, 18 km NW of Rotterdam and 9 km SSE of Den Haag (The Hague), capital of the Netherlands. Delft is accessed directly from the Amsterdam-Den Haag-Rotterdam highway, and it is serviced by a frequent train schedule.
The city of Delft was founded in 1075 AD by Duke Geoffrey of Lorraine and it was nearly destroyed by fire in 1536. Its spoken history dates from 1100, and its written from 1247. Its population numbered 23,900 in 1874, 28,000 in 1891, 34,000 in 1910, 70,000 in 1958, and 83,698 in 1971. Its current population is estimated to be approximately 86,000. The current chief industries in Delft are: pottery, cables, yeast, spirits and penicillin manufacturing.

Delft is known touristically primarily because of the old city section (#1 area on map 2) with its three main canals and picturesque housing which survived the Second World War intact, and also because of the once blooming pottery industry known as "Royal Delft Blue".

The city is composed of several sections, most of which are clearly recognizable and distinct from each other due to their physical characteristics, time of development and population composition.
map 2: Delft

(see next page for description of the sections on this map)
section 1: old city of Delft. It has little morphological relation to the other sections of the city.

section 2: some housing and sports facilities.

section 3: housing area behind the city's train station. It is composed of four housing quarters, one of which is the Westerkwartier (WK).

sections 4 & 5: modern housing districts. These areas serve mostly as "sleeping quarters" for workers commuting outside the Delft area.

section 6: new housing district, currently under development. Sections 4, 5, and 6 compose a total area of 810 hectares, and they all serve mostly as housing of commuter workers to Den Haag and Rotterdam.

section 7: industrial development.

section 8: area occupied by the Technical University of Delft, one of the two major universities of Netherlands.

section 9: industrial development.
Within the area marked #3 on map 2, is contained the WESTERKWARTIER (West Quarter), a residential area built for low income industrial workers during the industry boom of West Holland in the late 19th century.

map 3: Delft
housing behind station
Around the end of the 19th century, the west coast of Holland began to develop rapidly due to its proximity to the North Sea. Harbor industries boomed and a large number of workers was imported to the area and had to be housed. WK was built between 1879 and 1910 as one of the uneducated Catholic industrial workers' housing districts. The first section of the WK (Hovenierstraat area) was built between 1879 and 1896 against the town walls of the old Delft. In the 1880's there was free enterprise of house building in Holland, and parts of the WK were built under this system, which ended in 1901 with the government taking over, primarily because of the poor conditions for the residents. At that time, social building corporations were established and government control became stricter in low income workers' housing areas.

The WK resembles remarkably the British industrial towns of approximately the same period, with linear streets and low-rise brick row housing of minimum dimensions, with each house often consisting of no more than 1 room, kitchen and possibly sleeping loft per dwelling. Often the entire depth of a house can be seen through the front window which faces the public street (Fig. 193). The average total square footage of one dwelling is approximately 64m² (576 ft²).
The following plans and sections represent the typical kinds of housing that can be found in the Westerkwartier.
The average density in WK houses is 3.48 residents per dwelling, a figure considerably higher than the national average of Netherlands of 2.7 residents per dwelling. The overall density of the quarter is 86.6 houses per hectare (1,000 m², or 90,000 ft²), a fairly high figure. The total number of houses in the older section of the WK is approximately 900.

The physical limits of the WK are determined primarily by natural borders as they occur in the environment.

map 4: Westerkwartier
Buitenwatersloot, a canal street, defines the WK on the northern edge, and the railroad tracks on the eastern. These tracks were the original limit of the old city of Delft. The Westlandseweg, a large avenue bordering the newer housing districts and industrial sites, defines the limit of the WK on the south, and Krakeel Polderweg, another main street, on the west. The latter is the least defined natural limit, and it primarily separates WK from another housing district that was developed around 1930.

Originally, the entire population of the WK was composed of the families of low income unskilled industrial workers. In 1972 there were a number of students from the Technical University residing in the WK, primarily because purchasing a house in WK was considerably less expensive than renting an apartment in Oude Delft (the old city section). The cost of purchase of a typical WK house in 1972 was only between $4,500 and 21,000 ($1,800 and 8,400).

Nonetheless, the largest percentage of residents in 1972 was low income working class families. A number of elderly were also residing in the area, both as rentees and as owners.

The following figures are from a census study that was conducted in 1966 on Pootstraat, one of the major WK streets. Although by no means comprehensive, they give an approximate breakdown percentage of the resident population. Unfortunately, there were no figures available for the corresponding percentage of resident children under 16 years old. The breakdown of the resident population (excluding resident children under the age of 16) was as follows:
young workers 16 to 21 years old:  3.12%
people over 21 years old:
  non-educated workers:        31.77
  trained workers:             19.27
  employers:                  11.50
  men working in stores, etc.: 5.73
  unemployed:                 2.08
  men retired, over 65 years old:  7.81
  student residents:          3.64
  married working women:      8.85
  unmarried working women:    6.025

TOTAL.                        100%

Overall, the WK was, and currently is, a residential neighborhood of low income families, both rentees and owners.

On map #4, the entire WK neighborhood is shown within its physical limits. Within that, the area that underwent street renovations between 1972 and 1974 is outlined. This area encompasses all of the older housing sections and a small part of the newer ones. The bordering streets of the renovated area are: Buitenwatersloot on the north, Coenderstraat on the east, Frank Van Borselen straat on the south, and Krakeel Polderweg on the west. Within these limits, the neighborhood consists of mostly houses, some churches, schools and small corner stores. No industrial or large commercial buildings exist in the immediate area.
b. Setting for the Renovation

The movement of students into the WK area began in 1960, for the previously mentioned reasons. At the time, and up to 1972, there were no playgrounds in the area, and almost no trees. The public street lighting was inadequate, and the majority of houses needed rehabilitation. Since 1910 there had been no action from the government regarding any improvements in the WK.

With the underlying help of the student population, the residents founded various action groups and complained about the WK conditions to the Mayor's Board; thus, general unrest against local authorities became apparent in the early sixties.

In 1964, the preferred solution on the government's part was urban renewal--demolishing the entire WK area and replacing it with a new housing district. That intention was not welcomed by the residents, since it meant a total relocation for them. Loss of established contacts and known environs as well as the conviction that the rents in the new housing would be much higher were the primary reasons that the residents opposed a demolition project of their neighborhood.

With such protest becoming apparent to the city authorities, a house renovation/improvement program was proposed in 1965-66 for at least 598 houses that needed rehabilitation. The house renovations included broadening of windows, remodeling of kitchens, installation of shower facilities, improvement of electrical systems and of private gardens, and painting the house interior.

However, because the possibility of demolition of the entire area was not entirely averted, not all residents agreed to house
renovations at that point, even though a percentage of the costs was provided by the government.

In spite of the houses that did undergo renovations, the public space in the WK still remained much the same as during the previous fifty years. In 1967 the residents agreed to create one thoroughly pedestrian street (Tuinstraat) that would provide a safe play area for children*.

By the early seventies the WK situation was much the same, but a series of events slowly led to the '72-'74 process of street rehabilitation:

The new housing districts (areas #4 and #5 on map 2) were not very successful and caused the local government to reconsider its views toward total demolition of older residential quarters.

The Ministry of Culture, Recreation, and Social Works had ample financial resources available but no particular aim for it.

A general development in the political views in Holland reinforced the socialist programs of the labor council**.

The overall awareness of government personnel of the "outer ecology" of residential quarters increased, and the mental influence on residents of "what they saw outside their windows" was acknowledged.

The housing ministry made available £2,000 ($800) for every renovated WK house, to be used for the bettering of the WK streets.

---

*See Section 3a of this chapter for details.

**Socialist programs originally strived for demolition of old housing and construction of high-rises, but the awareness that this would not be a real solution finally arose also among the socialists.
The housing power in Holland was considerably centralized within the Department of Public Works, and politicians often condoned the proposals of that department—which gave Public Works considerable power in realizing their proposals.

People with key positions in the Department of Public Works in Delft were aware of the problems in the WK and had every intent of ameliorating the situation. The local elderman was also concerned about the urban environment.

The administrations of traffic engineering, traffic police, greenery, and urban planning were all under the jurisdiction of the Department of Public Works in Delft, primarily because of the small size of the town.

Mr. Thijs de Jong, the head of the urban planning administration of the Public Works Department, was a recent graduate of the Technical University of Delft and had already expressed during his school years a strong interest in the quality of residential precincts.

Mr. Joost Vahl, also a recent graduate of the Technical University, had worked with Thijs de Jong in exploring ideas on residential precincts, and he also worked towards their realization in other quarters of the city.

The streets in the WK were due for repavement. In general, streets in Delft need to be repaved every seven to twelve years because of ground settling.

Overall, in 1972 there was a widespread feeling both among government officials and the residents of the WK (students and not) that some amelioration of the environment was long due. Even
though it is a generalization, it would be correct to say that, in this instance, the "right forces operated at the right time, in combination". An awareness on the one hand on the part of the residents that their environment lacked necessary qualities and their willingness to actively assert their desires, and a desire on the other hand on the part of the government to try to grow and develop and correct previous mistakes in the treatment of residential districts, were forces great enough to cause a two year process of street renovation in the WK; this process has had a quite successful outcome for the residents.

The very implementation of the street renovations is mainly a product of the pushing power of Thijs de Jong and Joost Vahl; their work was cordially supported by the Director of the Public Works Department, Mr. K. Havinga.
2. WESTERKWARTIER: PROCESS

During the formal process of street changes in the WK, the following general sequence of steps was established:

- Information was generated by the Department of Public Works (usually the urban planning administration) and circulated to the residents of the WK.
- Residents reacted to proposals from the administration and informed the urban planning office. Mr. Anton Kribbe acted as the contact official.
- The administration advised the Mayor's Board regarding the residents' reactions.
- An official governmental response was given to the residents of the WK.
- The Department of Public Works requested funding and go ahead from the Mayor's Board.
- Information was made available by the urban planning administration to the WK residents regarding final design proposals for the street renovations.

The following two pages contain a translation of a document prepared by the urban planning office on January 1976 with regards to the participation procedure that involves residents and government. This short document recapitulates in a brief, and almost simplistic, manner the entirety of a complex process of interaction that has, since 1972, produced a number of new residential street environments. It is a process that requires a great deal of initiative and care, not only in executing street renovations, but also in preventing the process from becoming stale or existing without
without context or losing the initial goal: how an environment can, with the proper care and interest, serve its users, involve them in what happens to it, and provide them with a setting that is satisfactory and successful—according to the opinion of those who must live in it, not only those who design it.

SCHEMATIC PARTICIPATION PROCEDURE FOR FURNISHING THE HOUSING ENVIRONMENT, MUNICIPALITY OF DELFT, JANUARY 1976

Public Works Department sends a

LETTER/INFORMATION NEWSPAPER with an invitation for the first street meeting or proposal for street furnishing addressed to the inhabitants/workers of the specific street, to the Mayor and the Town Parliament Committee(s)

P.W.D. researches different possibilities/problem points concerning furnishing, e.g.: cables and piping as related to position of streets, needs or wishes that relate to rerouting traffic, loading and unloading, wishes/suggestions coming out of the street

1st STREET MEETING
- talk about information newspaper
- talk about general restrictions
- fix design criteria
- perhaps start a street working group

P.W.D./working group makes preliminary design and then alternatives—these are sent to inhabitants and workers

2nd STREET MEETING
- if there is a general agreement on the main point of the design then one meeting is enough
- talk about reactions received
- fix the main points of the design

P.W.D. makes definitive design according to

When there are no important topics, then it is possible to cancel this meeting, but in any event the inhabitants or the neighborhood representatives must be informed of the possibility to request a meeting. Inhabitants and workers are able to send their criticism of the fixed design criteria to the Mayor and the Parliament Committee.
feedback from the 2nd meeting and eventually in consultation with the working group

DEFINITIVE DESIGN to be sent to inhabitants and workers in the street, the Mayor's office, and the Parliament Committee(s)

Mayor's office and Parliament Committee can propose some restrictions/changes

inhabitants/workers can individually consult the Mayor's office in relation to specific changes concerning their individual house/working place

The definitive design is discussed with the relevant Parliament Committee. If this Committee wishes to impose restrictions/changes, the inhabitants must be informed and a process of exchange of opinions started

When the Mayor and the Parliament Committee agree on the design, then: REALIZATION.

The key people from the Public Works Department who were involved in the two year process were:

K. Havinga, director of the Public Works Department, under whose jurisdiction were the administrative heads of each section:

Thijs de Jong, urban planning
J. Bakker, traffic police
A. de Jong, greenery
D.H. ten Grotenhuis, traffic engineer.

The person responsible for the particulars of the design proposals and the active contact between residents and administration was Anton Kribbe. He is an electrician by training, interested in the design of residential precincts and employed by the urban planning administration as the chief designer since 1972. Mr. Hofman was the supervisor of the physical realization of the street changes in the WK.

According to T. de Jong, the general goals that the administration undertook in the WK were:
1. to provide a mixed use of the streets, and to allow both vehicular and pedestrian traffic.

2. to give priority to the pedestrian by:
   a. precisely defining the parking areas;
   b. allowing vehicular traffic to move only at pedestrian speeds;
   c. eliminating large trucks from the quarter, while acknowledging the consequences of such a step;
   d. reducing parking spaces and looking for alternative solutions to excessive street parking and truck parking.

3. to differentiate the traffic system and to provide alternative routes, with the unavoidable consequence of increased street vehicular traffic outside the quarter.

The following pages contain a translation of a document produced by the Municipality of Delft and distributed to all WK residents on February 15, 1972; this document marks the formal beginning of the two-year process, and it is the opening gesture on the part of the government towards the residents. Its purpose is to reach and involve the maximum number of people and to interest them in participating in an effort to create a better environment. Of the 1000 residents that the letter was sent to, 120 attended the first meeting on February 25 called for in the letter; at later meetings, fifty per cent of the residents attended. The original Dutch text precedes the translation.

It is important to note that the letter is signed by L.A. Weeber, director of the social work and public health department, thus reinforcing the seriousness of intent on the part of the Municipality. The strength of the language in the letter is also intended to reach the skeptical resident. This is achieved not only through choice of words, but also through the Municipality's
willingness to accept previous mistakes. Note how they express confidence in future success and how they allow the residents to have an active say about their own environment, while making clear the need for initiative on the part of the people. The visual image of a proposed renovation reinforces the serious intent, and also serves to "catch the eye", a necessity that words alone cannot accomplish.
To the Residents of the WK:

Two years ago they said your neighborhood was "ripe for destruction"--the name for that was "renewal". This is the way in which a lot of municipality people thought; also, a lot of you. But in the last ten years, we have had to change our minds:
- Renewal is not as easy as we thought; the negative aspects of a neighborhood that is disintegrating cannot so readily be foreseen;
- There are not enough cheap houses;
- There is still a big shortage of housing that makes it difficult to destroy houses that are still occupied;
- There is an increasing desire (especially on the part of young people) for a small house on which one can work oneself.

If the WK is to be renewed, it will be done in a different way than similar things have been done until now.

It will not be permitted to destroy more than a small group of houses at the same time. The areas that become empty in this manner must be filled up immediately with new housing or they must become green areas and children's play facilities.

But how long will it take before this renewal begins? And it must be done according to plans that have yet to be developed (in accordance with the residents).

Five years? Ten? Fifteen years? We don't know yet. For certain groups of houses perhaps in five years--for the greatest number of houses surely later--for some probably never.

The lack of rules and decisions on the part of the municipality creates vagueness. And vagueness results in lack of care and in
slow deterioration of buildings, because vagueness causes you or the owner to neglect repairs. We do not want this neglect, and, with the experience we have had with renewals, it is clear that a neighborhood just like the WK requires special attention. That is why the mayor of Delft and his departmental heads have decided to ask the town parliament to make available extra funds for the WK.

It is not that we suddenly want to be sentimental towards an old neighborhood--but that we don't see another solution in the foreseeable future other than to keep and make better what we already have. This improvement costs the municipality money and energy. In our opinion, it is worth the effort.


[page 1, typed text]

MUNICIPALITY OF DELFT

If we want to do something in the WK, then each person must be engaged in this process according to his specialty. The municipality can start immediately with the improvement of streets and the rehabilitation of houses, but there must also be money from the residents and from the owners.

THE MUNICIPALITY INVITES YOU TO COME TO AN INFORMATIONAL MEETING CONCERNING THE HOUSING AND NEIGHBORHOOD IMPROVEMENT OF THE WK ON FRIDAY FEBRUARY 25 8PM AT THE CAMINADA IN THE RAAMSTRAAT.
Who has the responsibility?

Representatives of the political parties sit in the town parliament. The town parliament decides on designs that have been presented by the mayor and his departmental heads. The mayor and his departmental heads commission these designs (which may or may not be requested by the town parliament) to the municipality administration. It makes no sense to make such designs profitable to no one. That is why there was a continuous discussion with the representatives of the neighborhood.

Through their actions, this committee has ensured that designs were developed and funds made available for realization. But more is necessary. One can act to procure funds, but of course there is never enough money. The municipality must make a choice among the actions it can take. There will always arise situations where it is said "this we can do, this we cannot do", and sometimes it must be said "yes, but not at this moment". Who makes this choice? You? or the administration of the municipality? It is better if you do it. The administration is there to show what is necessary and what is possible. But you live there and you can better judge what must be done today and what eventually can be done tomorrow. If you want your voice to also be decisive, you must take the initiative to be represented by the committee of neighborhood representatives.

You must make decisions concerning your streets with the residents of your street; decisions concerning your house must be made by yourself, or, if you are a renter, with the owner. Our building and housing department can help you with this.
Designs for housing and neighborhood improvement are prepared by the advisory group of the municipality. This group must ensure that there is enough contact between the residents (or residents' committees) and the leading group in the municipality as well as its various administrative departments. The president of the advisory group is the director of the Social Work and Public Health Department, L.A. Weeber.

[page 2, left-most column]

The Street

The street is more than a traffic lane. You live there, you sit there, you walk there, you play there. Your house is standing next to the street—the part of the street in front of the door belongs to your house.

The first reaction of a lot of people when they think of improving the neighborhood environment is to "close the street", to "make a play street". Such solutions create a lot of problems:

- a parking problem
- an accessibility problem
- a "who cleans the street" problem
- a garbage disposal problem

and so on.

It is surely possible to furnish a street so that the car can still pass through and yet the street remains a very clear area for pedestrians and for play. Bumps, bollards, ITT bars, curbs, and trees "regulate" the use possibilities. The residents determine the use.
The detailed manner in which the street should be furnished will not be discussed with the whole neighborhood, but street by street with the residents of each street.

This year (March, April, May, and June) trees will be planted throughout the entire neighborhood, new lightposts will be installed, and half of the streets in the neighborhood will be repaved. The following year the remaining half of the streets will also be repaved.

The street will be improved so that children can play more and more safely, and so that you can better take a walk and sit in front of your door. This means: a neighborhood that is better furnished as a pedestrian area with less parking.

No one way driving. One way driving results in the driver's driving faster and the bicyclists' needing to bike for longer distances. The chance to have traffic in both directions forces you to drive more slowly and with more care.

What is the municipality doing?

In each case the municipality will improve the street. This means better lighting, better pavement, and, if you want, trees in the streets and flowers in front of the doors.

- EXISTING SITUATION ON POOTSTRAAT
- EVENTUAL NEW SITUATION ON POOTSTRAAT
With you and with the leading committees of the schools in and around the neighborhood we will look to see if it is possible to use the various school sites--also after school hours--for all children in the neighborhood.

It is also the intent of the municipality to stimulate individual house improvements. This still remains to be worked out.

We want to discuss with you the designs for neighborhood improvement that can be realized in each case. Come to see us on Friday, February 25, at 8 pm in the Caminada.

Reduction and presentation by the Public Works Department of Delft.
3. WESTERKWARTIER: COMMENTS
   a. Tuinstraat: a solely Pedestrian Street

As mentioned previously, in 1967 the residents of Tuinstraat agreed on their own initiative to prohibit any vehicular traffic (excepting bicycles) on the southern-most block of Tuinstraat (Garden Street), in an effort to provide a safe play space for children in the area. The exclusion of motorized traffic was achieved in 1967 by placing steel spiked army wire on the street entrance. The current appearance of Tuinstraat is quite different, now that street furniture and bicycle racks have been installed during the '72-'74 renovation process. It is currently still a solely pedestrian street. The closing off of the street presented a number of problems both to Tuinstraat residents and to those of the neighboring streets. Tuinstraat attracted children's play activities and the resulting noise was an annoyance to many of the residents. Car parking for Tuinstraat residents was accommodated in neighboring streets, and the residents of those streets became dissatisfied with the increased number of cars.

It is my impression that after the '72-'74 process of changes throughout the WK, the major disadvantages for the residents of the pedestrian Tuinstraat were in part alleviated. The rest of the street environment took over some of the Tuinstraat functions, such as providing a play area for children, so that the noise problem was reduced. The addition of bicycle parking racks helped part of the parking accommodation problem. In terms of car parking, the residents of Tuinstraat continued to park on the bordering streets; their decision was to place a priority on children's
play over that of parking inconvenience. In addition, the overall resulting shortage of immediately available parking spaces for all WK residents brought the inhabitants of Tuinstraat closer to the rest of the district, simply by the fact of their "not being the only ones" anymore.

Nonetheless, there exists, up to this date, dissatisfaction among the residents of the neighboring streets. In 1972, a number of inhabitants refused to participate in the residents' committee of the WK due to the Tuinstraat issue, and they have continued to boycott these meetings.

I suspect that the experience provided by Tuinstraat helped the administration as well as the residents to understand that the creation of a solely pedestrian street in the WK was an extreme solution leading to the disadvantages and dissatisfactions mentioned above. Tuinstraat afforded the testing of an extreme solution and provided the chance to find not only the degree of resident acceptance of it, but also influenced directions that future solutions might take.
b. Considerations

In general it seems advisable, for proposed street renovations such as those in the WK, to begin the process by testing a particular proposed solution in a part of the environment, so that more conclusions can be drawn about the direction of the proposal most likely to succeed in terms of resident satisfaction in the entire area. Naturally, the factors that exist due to varying conditions in each street should be considered carefully, and the overall proposal ought be modified wherever necessary to fit particular resident requirements.

In attempting to create in the WK a street system in which no car would exceed the speed of 15 km per hour (10 miles per hour), the Public Works Department recognized the need for streets in the WK area that could accommodate faster through traffic. Coenderstraat, Buitenwatersloot, and Brouwerstraat (see Map 4) were designated for this purpose. The decision to organize the surrounding streets in a way that through traffic could pass without difficulty was based on the Public Works Department's experience with the older section of the city (Binnenstadt). Studies there concluded that "to reach any destination in the Binnenstadt, one rarely needs to go more than 500 meters off the main traffic way". Comparisons on time needed to traverse 500 meters on a "typical" Delft street versus a "renovated" street indicated that the overall travel time increased only a half minute.

The WK is a smaller area than the Binnenstadt. The strategy employed in specifying "through traffic" streets was one of expansion: Raamstraat served the function until it was renovated, at which point F.V. Borselen replaced it. Current plans are to
increase the renovated street area until the distance from the surrounding through traffic-streets to any point within the WK area reaches but does not exceed 500 meters. It is important to recognize that the assigning of through traffic streets was made only at the level of the Public Works Department, since it affected more of Delft's residents than only those of the WK.

In designing a new residential district, it is possible to plan a street layout that avoids residential buildings on through-traffic streets altogether, and that instead accommodates other facilities, such as a park with its major opening abutting the residential area, or extra parking accommodations for residents and their guests, or certain commercial enterprises, such as bus depots, railway stations, gas stations, or larger business stores and offices.
To return to the WK, however, I would like to show a reproduction of a pamphlet that was distributed to the WK residents. This booklet contains information regarding housing alterations and planting information.
In general the urban planning office attempted to remain in touch with the WK residents, to respond to their needs, and to give them suggestions regarding their immediate housing environment. The following is a reprint of a working drawing, given to me by the urban planning office of Delft. The formal drawing is the proposal that was presented to the residents of a particular housing block. The scribbled notes are responses to specific resident wishes. Note the suggestion for the making of a trellis.
Another point to be made regarding the effects of the street renovations in the WK is that the prices of the houses have almost tripled during the past two years. Of course, this increase in the prices benefits only the owners of homes, not the inhabitants who rent. It is difficult to say how the price increase could have been prevented; nonetheless, the designer should be aware of possible effects in similar renovation cases. It is important for the overall success of such a process for different specialists, both in design and in government, to coordinate their efforts. It is certainly critical for all departments related to street maintenance and security to cooperate and to advise each other. But most important of all is to establish a process through which the residents of the streets to be renovated can participate by expressing their wishes and needs. In addition, post evaluations of such renovation attempts should be done, so that the resident satisfaction can be accurately measured. This thesis has dealt only with a part of what a designer can do--and that is only a fraction of the total issues involved in creating street environments.
X. LIST OF FIGURES

1. Hamburg, West Germany
2. Glyfada, Athens, Greece
3. Westerkwartier (WK), Delft, Holland
4. WK
5. WK
6. WK
7. Delft, Holland
8. WK
9. Delft, Holland
10. WK
11. WK
12. Santa Cruz, California, USA
13. Delft, Holland
14. WK
15. Santa Cruz, California, USA
16. WK
17. WK
18. WK
19. WK
20. Gilroy, California, USA
21. WK
22. WK
23. Delft, Holland
24. WK
25. WK
26. Stümpfelbac, West Germany
27. WK
28. Delft, Holland
29. WK
30. Delft, Holland
31. Santa Cruz, California, USA
32. Santa Cruz, California, USA
33. Gilroy, California, USA
34. Gilroy, California, USA
35. WK
36. Santa Cruz, California, USA
37. WK
38. WK
39. Santa Cruz, California, USA
40. WK
41. WK
42. WK
43. WK
44. WK
45. WK
46. WK
47. WK
48. Santa Cruz, California, USA
49. Santa Cruz, California, USA
50. WK
51. WK
52. WK
53. WK
54. WK
55. WK
56. Athens, Greece
57. Santa Monica, California, USA
58. Delft, Holland
59. Falkenried, Hamburg, West Germany
60. Falkenried, Hamburg, West Germany
61. WK
62. WK
63. Angelso, Emmen, Holland
64. WK
65. Athens, Greece
66. Gilroy, California, USA
67. Falkenried, Hamburg, West Germany
68. Delft, Holland
69. Ensenada, Mexico
70. Ensenada, Mexico
71. WK
72. WK
73. Ensenada, Mexico
74. WK
75. WK
76. WK
77. WK
78. WK
79. WK
80. Santa Cruz, California, USA
81. WK
82. WK
83. WK
84. WK
85. WK
86. WK
87. WK
88. Gilroy, California, USA
89. WK
90. WK
91. WK
92. WK
93. WK
94. WK
95. WK
96. Athens, Greece
97. WK
98. WK
99. Delft, Holland
100. WK
101. WK
102. Kastro, Sifnos, Greece
103. Kastro, Sifnos, Greece
104. Kastro, Sifnos, Greece
105. Mörbisch Am See, Burgenland, Austria
106. Glückstadt, West Germany
107. WK
108. Helmond, Holland
109. Kastro, Sifnos, Greece
110. WK
111. Santa Monica, California, USA
112. Gilroy, California, USA
113. Gilroy, California, USA
114. Vienna, Austria
115. WK
116. San Francisco, California, USA
117. WK
118. Delft, Holland
119. WK
120. WK
121. WK
122. WK
123. WK
124. Delft, Holland
125. Delft, Holland
126. WK
127. WK
128. WK
129. WK
130. WK
131. Hora, Serifos, Greece
132. Hora, Serifos, Greece
133. Gilroy, California, USA
134. Apollonia, Sifnos, Greece
135. Limburg A.L., West Germany
136. Gilroy, California, USA
137. Mörbisch Am See, Burgenland, Austria
138. Frankfurt, West Germany
139. Frankfurt, West Germany
140. Övelgönne, Hamburg, West Germany
141. San Francisco, California, USA
142. WK
143. WK
144. WK
145. WK
146. WK
147. WK
148. WK
149. WK
150. WK
151. WK
152. Angelso, Emmen, Holland
153. Övelgönne, Hamburg, West Germany
154. WK
155. Angelso, Emmen, Holland
156. Gilroy, California, USA
157. Artemon, Sifnos, Greece
158. WK
159. WK
160. WK
161. WK
162. Hamburg, West Germany
163. Gilroy, California, USA
164. Lübeck, West Germany
165. Svendborg, Denmark
166. Blankenese, Hamburg, West Germany
167. WK
168. WK
169. Blankenese, Hamburg, West Germany
170. Santa Cruz, California, USA
171. Athens, Greece
172. Athens, Greece
173. Bern, Switzerland
174. Ensenada, Mexico
175. Venice, California, USA
176. WK
177. WK
178. Vouliagmeni, Athens, Greece
179. WK
180. Venice, California, USA
181. Mühlemannsberg, Hamburg, West Germany
182. Ensenada, Mexico
183. Hamburg, West Germany
184. Delft, Holland
185. Athens, Greece
186. Athens, Greece
187. Athens, Greece
188. Athens, Greece
189. Vienna, Austria
190. Eppendorf, Hamburg, West Germany
191. Santa Cruz, California, USA
192. WK
193. WK
194. Mörbisch Am See, Burgenland, Austria
195. Athens, Greece
196. Mörbisch Am See, Burgenland, Austria
197. San Francisco, California, USA
198. Gilroy, California, USA
199. WK
200. Vienna, Austria
201. Ardez, Engadin, Switzerland
202. Ardez, Engadin, Switzerland
203. Delft, Holland
204. Delft, Holland
205. WK
206. WK
207. Delft, Holland
208. WK
209. WK
210. WK
211. WK
212. WK
213. WK
214. WK
215. Bensberg, West Germany
216. WK
217. WK
218. WK
219. WK
220. Delft, Holland
221. Delft, Holland
222. Blankenese, Hamburg, West Germany
223. Kastro, Sifnos, Greece
224. Hamburg, West Germany
225. Hamburg, West Germany
226. Lübeck, West Germany
227. Lübeck, West Germany
228. Ribe, Denmark
229. Lübeck, West Germany
230. Lübeck, West Germany
231. Luzerne, Switzerland
232. Möhrisch Am See, Burgenland, Austria
233. Möhrisch Am See, Burgenland, Austria
234. Möhrisch Am See, Burgenland, Austria
235. Steilshoop, Hamburg, West Germany
236. Steilshoop, Hamburg, West Germany
237. Artemon, Sifnos, Greece
238. Hamburg, West Germany
239. Santa Monica, California, USA
240. Santa Monica, California, USA
241. WK
242. WK
243. WK
244. WK
245. WK
246. WK
247. WK
248. WK
249. WK
250. WK
251. WK
252. Delft, Holland
253. WK
254. WK
255. WK
256. Övelgönne, Hamburg, West Germany
257. Delft/Rotterdam Route, Holland
258. Falkenried, Hamburg, West Germany
259. Eppendorf, Hamburg, West Germany
260. Athens, Greece
261. WK
262. WK
263. WK
264. WK
265. Delft, Holland
266. Delft, Holland
267. WK
268. WK
I would like to thank Mr. Anton Kribbe of the Urban Planning Administration of Delft, Holland for granting me use of the following prints:

94, 95, 99, 124, 125, 192, 193, 281, and the five sets of comparative prints at the end of each chapter, and for background material on the WK, and Professor Jos Weber of the Technical University of Delft for print no. 173, and for overall assistance, and for translations of Dutch material on the WK.

My sincere thanks go also to Bemis and Graham Foundations that financed part of my research in the Westerkwartier.