294B

NATIONAL COOPERATIVE
HIGHWAY RESEARCH PROGRAM REPORT **294B**

PLANNING AND IMPLEMENTING PEDESTRIAN FACILITIES IN SUBURBAN AND DEVELOPING RURAL AREAS

State-of-the-Art Report

TRANSPORTATION RESEARCH BOARD
NATIONAL RESEARCH COUNCIL

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AREAS OF INTEREST:

PLANNING
FACILITIES DESIGN
OPERATIONS AND TRAFFIC CONTROL
(HIGHWAY TRANSPORTATION)

TRANSPORTATION RESEARCH BOARD
NATIONAL RESEARCH COUNCIL
WASHINGTON, D.C. JUNE 1987

NATIONAL COOPERATIVE HIGHWAY RESEARCH PROGRAM

Systematic, well-designed research provides the most effective approach to the solution of many problems facing highway administrators and engineers. Often, highway problems are of local interest and can best be studied by highway departments individually or in cooperation with their state universities and others. However, the accelerating growth of highway transportation develops increasingly complex problems of wide interest to highway authorities. These problems are best studied through a coordinated program of cooperative research.

In recognition of these needs, the highway administrators of the American Association of State Highway and Transportation Officials initiated in 1962 an objective national highway research program employing modern scientific techniques. This program is supported on a continuing basis by funds from participating member states of the Association and it receives the full cooperation and support of the Federal Highway Administration, United States Department of Transportation.

The Transportation Research Board of the National Research Council was requested by the Association to administer the research program because of the Board's recognized objectivity and understanding of modern research practices. The Board is uniquely suited for this purpose as: it maintains an extensive committee structure from which authorities on any highway transportation subject may be drawn; it possesses avenues of communications and cooperation with federal, state, and local governmental agencies, universities, and industry; its relationship to the National Research Council is an insurance of objectivity; it maintains a full-time research correlation staff of specialists in highway transportation matters to bring the findings of research directly to those who are in a position to use them.

The program is developed on the basis of research needs identified by chief administrators of the highway and transportation departments and by committees of AASHTO. Each year, specific areas of research needs to be included in the program are proposed to the National Research Council and the Board by the American Association of State Highway and Transportation Officials. Research projects to fulfill these needs are defined by the Board, and qualified research agencies are selected from those that have submitted proposals. Administration and surveillance of research contracts are the responsibilities of the National Research Council and the Transportation Research Board.

The needs for highway research are many, and the National Cooperative Highway Research Program can make significant contributions to the solution of highway transportation problems of mutual concern to many responsible groups. The program, however, is intended to complement rather than to substitute for or duplicate other highway research programs.

NCHRP REPORT 294B

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The members of the technical committee selected to monitor this project and to review this report were chosen for recognized scholarly competence and with due consideration for the balance of disciplines appropriate to the project. The opinions and conclusions expressed or implied are those of the research agency that performed the research, and, while they have been accepted as appropriate by the technical committee, they are not necessarily those of the Transportation Research Board, the National Research Council, the American Association of State Highway and Transportation officials, or the Federal Highway Administration, U.S. Department of Transportation.

Each report is reviewed and accepted for publication by the technical committee according to procedures established and monitored by the Transportation Research Board Executive Committee and the Governing Board of the National Research Council.

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FOREWORD

By Staff
Transportation
Research Board

Highway engineers, urban designers, decision-makers, and the general public will be interested in the research findings of this two-part report. A wealth of information has been drawn from interviews and discussions with planning and design practitioners, recent research, and 28 case studies of pedestrian facilities from around the United States. The first part of the report presents guidelines and principles that can be used by practitioners in planning, designing, and implementing pedestrian facilities, with emphasis on planning and implementation. The second part of the report presents detailed supporting information and examples of both good and bad planning and design practice. Together, the reports (*NCHRP Report 294A* and *NCHRP Report 294B*) present a methodology for providing convenient and safe pedestrian movement for surburban and developing rural areas.

As the American population shifted from urban centers to more dispersed settings in suburban and rural areas, traffic volumes on highways increased substantially. The population shift, combined with changing land-use patterns and a renewed interest in physical fitness, has also resulted in increased pedestrian demand in these areas. Highway planners and designers have been cognizant of increased traffic volumes, but have not always given adequate consideration to the convenience and safety of those walking in suburban and rural areas.

Pedestrian circulation systems in suburban and urbanizing rural areas are often incomplete and ineffective. These situations have resulted in a rising level of pedestrian-vehicle conflicts on high-speed, high-volume highways. In the past, solutions to pedestrian vehicular conflicts in these areas have favored vehicular traffic. Convenient, yet safe, pedestrian access to and from magnets, such as redeveloping and changing strip commercial areas, shopping centers, office complexes, and mixed-use areas, is needed. Pedestrians need facilities that will not force them either to be dependent on automobiles or to take the risk of walking in unsafe circumstances. They need convenient and low-risk linkages between magnets.

Current trends in suburban revitalization (2nd phase growth) fostered by governmental policy and responded to by private development initiatives suggest that there will be many opportunities to modify and improve pedestrian facilities in the near future while remaining cognizant of the need for safe and efficient traffic flow. There is a need for cost-effective solutions for pedestrian circulation that take into account the physical and demographic characteristics of an area. Furthermore, there is a need for a methodology for such solutions to assist decision-makers, planners, and the public in understanding and evaluating available options.

NCHRP Project 20-19, "Pedestrian Convenience and Safety on Suburban and Rural Highways," was initiated to provide a methodology responsive to the needs outlined above. The general objective of this research was to develop a planning and implementation methodology to assist planners, designers, decision-makers, and the public in providing convenient and safe pedestrian movement for suburban areas having a heavy traffic corridor with adjacent pedestrian magnets, and in rural areas that are in, or likely to be in, transition to suburban areas. The methodology is not an isolated stand-alone process, but requires the integration of pedestrian needs into processes that already exist at the state and local level—processes such as comprehensive planning and site planning. Application of the principles and guidelines in the report should result in the creation of coherent (usable, understandable, continuous) pedestrian circulation for high activity subareas with the potential for connection to community-wide systems.

The results of Project 20-19 are presented in two reports:

1. *NCHRP Report 294A,* "Planning and Implementing Pedestrian Facilities in Suburban and Developing Rural Areas—Research Report."
2. *NCHRP Report 294B,* "Planning and Implementing Pedestrian Facilities in Suburban and Developing Rural Areas—State-of-the-Art Report."

Report 294A presents basic principles and guidelines and covers the general topics of pedestrian travel behavior and accident characteristics, commonly occurring problems with suburban pedestrian facilities, pedestrian planning within the context of the overall planning and development process, pedestrian-sensitive site planning, planning for pedestrian facilities within the highway right-of-way, and implementation of pedestrian facilities.

Report 294B presents detailed supporting information on all aspects of the research. The information is presented as Appendixes A through F. The areas covered include study procedures (Appen. A); case studies (Appen. B); walk trip characteristics and pedestrian accident statistics (Appen. C.); and pedestrian-related development guidelines (Appen. D). Appendix E is a collection of photographs illustrating planning and design treatments. Appendix F is an annotated bibliography of selected references.

Together *Reports 294A* and *294B* present comprehensive information and guidelines on the provision of facilities for the pedestrian. Implementation of the principles and practices presented should result in a significantly improved environment for the pedestrian in and around the many new developments in the growing suburbs and the urbanizing rural areas of America.

CONTENTS

ACKNOWLEDGMENTS

The research reported herein was performed under NCHRP Project 20-19 by JHK & Associates (JHK), Alexandria, Virginia. The Center for Applied Research, Inc., and RTKL Associates, Inc., were subcontractors to JHK.

Steven A. Smith, Senior Associate with JHK, was the principal investigator. The other authors of this report are: Kenneth S. Opiela and Laurel L. Impett of JHK & Associates; Martin T. Pietrucha and Richard L. Knoblauch of the Center for Applied Research, Inc., and Chuck Kubat of RTKL Associates, Inc.

The authors would like to express their appreciation to the many agencies and individuals that provided input to this project. Many individuals, too numerous to specifically acknowledge here, provided information on pedestrian planning and design practices within their own agencies and organizations. Other individuals volunteered their time to participate in the focus group interviews held on the east and west coasts in the early stages of the project.

We would also like to thank the agencies and individuals with whom we had contact in conducting the detailed case study investigations. Individuals contacted provided substantial time and copies of maps, site plans and project documentation, enabling us to compile the information presented in the report.

PLANNING AND IMPLEMENTING PEDESTRIAN FACILITIES IN SUBURBAN AND DEVELOPING RURAL AREAS

State-of-the-Art Report

SUMMARY The research conducted under NCHRP Project 20-19 has resulted in the publication of two reports: *NCHRP Report 294A* and *NCHRP Report 294B.* This report (*Report 294B*) provides detailed supporting information on all aspects of the research effort. The information is presented as Appendixes A through F. The areas covered include study procedures (Appen. A); case studies (Appen. B); walk trip characteristics and pedestrian accident statistics (Appen. C); and pedestrian-related development guidelines (Appen. D). Appendix E is a collection of photographs illustrating planning and design treatments. Appendix F is an annotated bibliography of selected references.

The reader of this report will also want to consult the companion document, *NCHRP Report 294A,* "Planning and Implementing Pedestrian Facilities in Suburban and Developing Rural Areas—Research Report," which contains the main findings of the research. *Report 294A* should serve as a basic reference on the planning, design, and implementation of pedestrian facilities in suburban and developing areas. The information is based on interviews and discussions with planning and design practitioners, recent research, observation and inventory of many pedestrian facilities, both good and bad, from around the United States, and more detailed case study evaluations at 28 sites. *Report 294A* presents the results of the research in the form of basic principles, and *Report 294B* illustrates the various principles by providing detailed supporting information together with examples of both good and bad practice.

APPENDIX A

STUDY PROCEDURES

Appendix A provides the background on the research procedures employed in NCHRP Project 20-19. They are discussed in the following order:

- Literature Review
- National Survey of Agencies and Individuals
- Focus Group Interviews
- Residential Surveys
- Pedestrian Surveys
- Site Inventories
- Other Data Collection
- Development of Evaluation Criteria
- Conduct of Case Studies
- Problem and Solution Identification

LITERATURE REVIEW

The subjects of this study span many disciplines, including transportation planning, land use planning, engineering, architecture, urban design, human factors and traffic safety. Because of the breadth of the subject area, an effort was made to limit the reviews of references to those areas dealing more directly with the subjects at hand - land use planning (as related to pedestrian travel), site planning, local planning processes, pedestrian networks, pedestrian safety, highway design, traffic operations, financing, and maintenance. Other areas with implications on pedestrian planning, design and implementation were included as they related to the above topic areas.

A key source for locating information on these subjects was the Transportation Research Information Service (TRIS). The Pedestrian Committee of the Transportation Research Board had recently conducted a TRIS search of literature and had compiled the results into a document along with a subject and author index also generated from TRIS. The some 2000 abstracts from the TRIS search were reviewed, and documents of additional interest were pursued further. Other sources of documents included bibiographies from various references and the research team's own knowledge of the literature. Selected findings from the literature review have been integrated into the discussions on pedestrian planning, design and implementation in the body of the report. A document-by-document reporting of the findings was not prepared. However, the annotated bibliography indicates the nature and emphasis of those documents likely to be of most interest to the practitioner.

NATIONAL SURVEY OF AGENCIES AND INDIVIDUALS

One of the tasks undertaken early in the project was a survey of state highway departments, local planning agencies and certain individuals with a background in planning and other pedestrian-related disciplines. A questionnaire was sent to approximately 200 agencies and individuals to acquire information on what were perceived as the major pedestrian-related problems in suburban areas, what solutions had been applied, and whether specific examples of particularly good pedestrian treatments existed in their state or urban area.

Figure A-1 shows the questionnaire sent to state agencies. The questionnaire consisted of a planning-related element and a design-related element. The extent to which agencies responded to both elements depended on their background. Some agencies perceived themselves as only involved in design or only involved in planning.

The philosophy used in constructing the questionnaire was to keep it relatively brief and open-ended. Going into the questionnaire, there were many unknowns in how seriously agencies perceived the pedestrian problem and in the types of solutions applied. It was felt that an open-ended technique would provide the research team with a better indication of the true perception of the problem than a multiple choice or ranking type questionnaire. This required a classification of responses after the survey was completed, and proved to be effective in drawing out the real thoughts of the respondents, avoiding potential biases that might have come from another type of survey. However, the written responses required may have also reduced the response rate, since this type of questionnaire usually requires more time to fill out.

The response rates were as follows: States - 17 out of 21; Local planning agencies - 24 out of 126; individuals - 6 out of 45. This yielded a total response rate of 24 percent. The responses were classified and tabulated by question. The results are available from the Transportation Research Board. A number of examples of pedestrian-related planning and design studies, local codes, regulations

QUESTIONNAIRE ON PEDESTRIAN PLANNING AND DESIGN PRACTICES

The purpose of this questionnaire is to obtain information on your agency's current pedestrian planning and design practices for suburban areas and developing rural areas. The questionnaire also asks you to identify problems you are currently experiencing in accommodating pedestrians in these areas and to identify solutions or design ideas which could benefit other agencies. The questionnaire deals with the overall planning process as well as with certain pedestrian facility design issues. If another department needs to be involved in the response or if it is more appropriate for them to respond, please pass the questionnaire along to the appropriate persons.

Areas of interest to us include: 1) strip commercial areas, 2) major suburban shopping centers, 3) suburban business districts, 4) mixed use and planned unit developments, 5) residential areas, 6) rural areas in transition to suburban, 7) schools, and 8) connections between major pedestrian trip generators.

Some of the design features to be addressed include: highway design (cross-section, intersections and interchanges), parking lot design, signal phasing and timing, use of over and underpasses, sidewalk/pathway location and design, and crosswalk location and type. We would appreciate your filling out the information requested and returning your response to the address indicated at the end of the questionnaire. If there is a charge for the reproduction of any materials, we will gladly reimburse you. You may need to add extra sheets for some of the questions.

Your Name: _____ Title: _____

Agency Name: _____

Address: _____

Jurisdiction: _____ Phone: _____

Jurisdiction Statistics:

Population: _____ Employment: _____

---

1. For which of the following functions is your agency responsible? (Check all those which apply)

   - preparation of master plans _____
   - site plan review _____
   - preparation and/or review of highway design plans _____
   - traffic operations _____
   - other _____

Planning-related Questions

2. What references or textbooks do you use to guide the overall site planning for new development, particularly as it relates to pedestrians? _____

_____

_____

3. What provisions do you make in your planning process or development review process for assuring that pedestrian facilities are adequate? It would be appropriate to describe regulations you have for guiding the planning and design of pedestrian facilities. Also describe approaches you use for negotiating with local jurisdictions and/or developers to provide amenities which could be pedestrian-related. We would appreciate receiving any written documentation of guidelines or procedures that relate to this; especially parts of your regulations or policies that directly or indirectly pertain to pedestrian facilities.

_____

_____

_____

_____

4. Do you have a state-wide plan or program which includes pedestrian facilities?

_____

Explain, if necessary. _____

_____

_____

Figure A-1. National Questionnaire on Pedestrian Planning and Design Practices

5. How severe do you think the problem of inadequate pedestrian facilities is in suburban areas within your jurisdiction? Please comment on the types of problems you have observed. _____

_____

_____

_____

6. What are some of the problems you experience in planning for pedestrian facilities?

_____

_____

7. What sources of funds have you used or would you consider using to provide additional pedestrian facilities? _____

_____

8. How do you think you could improve your planning process for pedestrians? Please include comments on the planning process itself and on regulation and other legal tools.

_____

_____

Design-related Questions

9. What references do you use in highway design, particularly in the pedestrian-related features of highway design? _____

_____

_____

10. What are the most significant design or operational problems you face when dealing with pedestrian needs in suburban and developing rural areas? This may involve highway design features, traffic signal phasing and timing, provision of sidewalks and crosswalks, etc. _____

_____

_____

_____

_____

11. Do you have within your jurisdiction examples of "successful" pedestrian designs or operational treatments that might be of interest to other planners and designers? If so, briefly describe the nature of the design. Take extra pages, if necessary. If you have backup material we would appreciate receiving a copy. The examples need not have been major construction efforts or developments, but could be seemingly simple ideas that made the pedestrian environment safer or more convenient to use. However, comprehensive pedestrian treatments are also of interest. Please comment on any financial, institutional or procedural arrangements that helped to make it a success. Photographs would be helpful, if they are available. We will pay for or promptly return any materials provided.

_____

_____

_____

_____

_____

12. Although rural highways are not the major emphasis of this study, they are of interest. What ideas do you have to improve the way in which pedestrians are accommodated on rural roads?

_____

_____

Thank you for your assistance. Please return the completed questionnaire and appended materials to:

and other materials were returned with the questionnaires. Several of these have been used as illustrations in the body of this report. There were relatively few suggestions from the respondents on places to look for successful pedestrian planning and design examples in suburban areas. A general sense from the surveys was that few felt they were doing a particularly good job of accommodating pedestrians in suburban areas.

It was also apparent that, even with the responses received, some agencies still have little interest in pedestrian issues. Although unfortunate, it is indicative of some of the inertia that will need to be overcome to make significant strides in improving pedestrian facilities in certain suburban and developing rural settings.

On the other hand, however, it is clear that many of the respondents have taken great interest in this subject and recognize it as an important one in the overall planning and design of land use and transportation systems. Most of the responses provided excellent information on problems, potential solutions, and implementation and funding considerations. Follow-up contacts were made with a selected number of those who did not respond as well as with certain ones that did respond to obtain additional information.

FOCUS GROUP INTERVIEWS

Two focus group interviews were held in Fall, 1985, for the purpose of discussing pedestrian problems and issues with a cross section of public agency representatives, planning and design consultants, and facility users. The focus group sessions were held in the offices of JHK & Associates, one in Alexandria, Virginia, and one in San Francisco, California. Each discussion was held over an informal luncheon session from 11:00 AM to 1:00 PM, and involved 11 to 12 individuals from various disciplines, either directly or indirectly related to the pedestrian field. These included representatives of jogging associations, walking associations, senior citizen groups, enforcement agency, local planning departments, local traffic engineering departments, state highway departments, public schools, developers, Federal Highway Administration, and architectural/design firms.

The meeting format included approximately five minutes for each participant to voice his or her concerns and ideas regarding pedestrian planning, design and implementation. This was followed by a period of responses and comments on what had been said up to that time. Finally, several more specific issues were addressed, delving into the underlying reasons that many of the current problems exist. Materials had been distributed to participants in advance so that adequate thought and preparation could be given to the subjects of discussion. As a result, the feedback was excellent, and contributed greatly to the research team's understanding of certain pedestrian issues. The results of the focus group interview were summarized and distributed to the participants, requesting any additional comments. The sessions were also taped. Observations and ideas were integrated into the findings and the development of the planning and design guidelines.

RESIDENTIAL SURVEYS

Two types of surveys were conducted involving users of pedestrian facilities. The first was oriented around residential areas. It consisted of self-administered mail-back surveys of residents in a variety of suburban communities. Questions were asked regarding trip frequency and length for four trip types: recreational walking, jogging, trips to work and trips for shopping or personal business. The survey also focussed on the perception by the residents of the plusses and minuses of their area for walking and jogging. The survey instrument is shown in Figure A-2.

The sites were selected to represent a range in geographic location, age of residence, and extent to which the area had been planned. They included a mix of case study sites and those that were not.

The following characterizes the land use setting for each area:

- Costa Mesa, a suburb of Los Angeles, with development and commuting patterns somewhat typical of that metropolitan area
- Claremont, California, an established community having a significant college population, west of Los Angeles with a much greater walking orientation
- Columbia, a "new town" between Washington, D.C. and Baltimore, Maryland, incorporating an extensive system of pedestrian and bicycle pathways
- Chesterbrook, a planned community in suburban Philadelphia, also with an extensive pathway system,
- selected older sections of a suburban community of Boston, Massachusetts
- Burke, Virginia, a relatively new community in Northern Virginia, but with no special pathway provisions in the areas surveyed
- a neighborhood in the Bailey's Crossroads area of Arlington County, Virginia, located in close proximity to a major center of employment.

SURVEY OF WALKING HABITS IN COSTA MESA, CALIFORNIA

Dear Resident of Costa Mesa:

The Transportation Research Board (part of the National Academy of Sciences) is undertaking a study of how to improve the safety and convenience of pedestrian travel in suburban areas. As part of this study, a number of communities in various areas of the United States have been selected at which to conduct surveys of the walking habits of individual residents and of their attitudes toward facilities provided for walking. Costa Mesa is one of the areas being surveyed.

We would appreciate your taking a few moments to fill out this questionnaire for the adult members of your household (up to two adults). For the multiple choice questions, use a circle for the first adult and a triangle for the second one. For the other questions, identify as adult 1 or adult 2. When you have completed the questionnaire, please fold it in thirds so that the return address is showing, tape or staple the long edge, and drop it in the mail.

The results of the survey will be used in summary form only. You need not provide your name or address, and individual questionnaires cannot be identified by name. The results will be used to guide public agencies in how to better accommodate the needs of pedestrians. Thank you for your assistance.

NO POSTAGE NECESSARY IF MAILED IN THE UNITED STATES

BUSINESS REPLY MAIL
FIRST CLASS PERMIT NO. 5991 ALEXANDRIA, VIRGINIA

POSTAGE WILL BE PAID BY ADDRESSEE

COSTA MESA PEDESTRIAN SURVEY
4660 Kenmore Avenue, Suite 1112
Alexandria, VA. 22304

PLEASE TURN OVER

Figure A-2. Residential Survey

1. a) Do you ever go walking for exercise or for recreational purposes (circle for adult 1, triangle for adult 2)?
   1. Yes 2. No

   b) (Answer only if 1a was Yes) Approximately how often?
   1. 5-7 days/week
   2. 1-4 days/week
   3. 1-3 times/month
   4. Less than once per month
   5. Never

   c) When you do walk for exercise, approximately how far do you walk?
   Adult #1 _____ mile(s) or _____ minutes
   Adult #2 _____ mile(s) or _____ minutes

2. a) Do you ever run or jog for exercise?
   1. Yes 2. No

   b) (Answer only if 2a was Yes) Approximately how often?
   1. 5-7 days/week
   2. 1-4 days/week
   3. 1-3 times/month
   4. Less than once per month
   5. Never

   c) What is the average distance that you jog? #1 ____ mile(s) #2 ____ mile(s)

   d) Where do you typically go jogging?
   1. Sidewalks near home
   2. On the road near home
   3. On a special pathway
   4. On a track nearby
   5. Near the office
   6. Other _____

3. a) Do you work outside the home?
   1. Yes 2. No

   b) (Answer only if 3a was Yes) How far away is that?
   #1 ____ mile(s) #2 ____ mile(s)

   c) How do you normally get to work?
   1. Car or truck
   2. Bus/train
   3. Walk (approximately how far? #1 __ mi. #2 __ mi.)
   4. Bike
   5. Other (Specify _____)

4. a) Do you ever walk from home to the store or bank or other places of business?
   1. Yes 2. No

   b) If yes, about how often?
   1. 5-7 days/week
   2. 1-4 days/week
   3. 1-3 times/month
   4. Less than once per month
   5. Never

   c) About how far is that? #1 __ mi. #2 __ mi.

5. How would you rate the safety of walking in this area?
   1. Excellent 2. Good 3. Fair 4. Poor

6. How would you rate the convenience or pleasantness of walking in this area?
   1. Excellent 2. Good 3. Fair 4. Poor

7. What specifically do you like about walking in this general area?

   #1 _____

   #2 _____

8. What do you dislike?

   #1 _____

   #2 _____

9. What do you think could be done to make your walking safer or more convenient?

   #1 _____

   #2 _____

10. How many cars do you have in your household? _____

11. What is your age, to the nearest 10 years? #1 _____ years #2 _____ years

12. Sex: 1. Male 2. Female

In all cases, the surveys were distributed in residential areas that were convenient to areas of shopping and personal business. The availability of employment nearby varied from one area to another. The areas included in the survey generally represented middle to upper-middle income levels. Only the adult population of a household were included in the survey. The results of the survey were reported by trip type, along with the other data obtained from the literature and from previous studies. The attitudinal questions were designed to be open-ended for the same reason as mentioned in the national survey. These questions were classified and tabulated based on the responses that were received.

In each location, 200 questionnaires were distributed. From these, the following responses were received:

- Costa Mesa - 29 forms representing 43 persons
- Claremont - 86 forms representing 131 persons
- Columbia - 37 forms, representing 61 persons
- Chesterbrooke - 42 forms representing 63 persons
- Burke - 43 forms representing 68 persons
- Boston - 25 forms representing 37 persons
- Arlington - 27 forms representing 38 persons

It should be emphasized that the purpose of the questionnaires was not to perform a statistical comparison between the locations, but to develop general information on trip purpose, trip length, trip frequency, and perceptions of walking from the perspective of the user. In light of the sample sizes, the confidence intervals for the questions dealing with proportions are in the range of plus or minus eight to 12 percent with 95 percent confidence. The results of the surveys are reported in Appendix C.

PEDESTRIAN SURVEYS

Surveys were also conducted at a smaller sample of locations in the Washington, D.C. area. Personal interviews were conducted with those walking along highways or pathways in the selected areas. These surveys were focussed around several of the case study areas, including Bethesda, Maryland; Ballston, in Arlington County, Virginia; Loisdale Road, across from Springfield Mall in Springfield, Virginia; the Washington and Old Dominion pathway (2 separate locations in Arlington); Skyline Center in Falls Church, Virginia; and along Route 7 in Tyson's Corner, Virginia. Between 10 and 50 interviews were conducted on the sidewalk at each location, depending largely on the volume of pedestrians in the area. The attitudinal questions were open-ended, and interviewers were instructed not to provide the respondent with a list of possible answers so as to obtain a true indication of how severely the problems were perceived. Figure A-3 shows the survey form.

The perception of problems with the pedestrian network were particularly instructive from this survey. The general data on walk trip frequency, purpose, etc. provided a perspective on walking characteristics.

SITE INVENTORIES

A major effort in this project was the conduct of walking tours and field reviews of pedestrian facilities (or lack thereof) at 160 sites in the east, midwest, and west. The purpose of these inventories was to document common problems noted in the field and to think through how those problems might be solved through either improved planning, better design, improved implementation strategies, etc. The intent was to force the members of the research team to be placed in the shoes of the pedestrian and to more fully understand the types of problems experienced.

The inventory consisted of the observation of the site and recording of both the problem being noted (if any) and possible solutions suggested. Figure A-4 shows the form used for recording these observations. Photographs were obtained at virtually every site.

Experienced staff from several JHK offices were employed to broaden the geographical spread of these sites. In addition, the research team used other travel opportunities as a means to examine features of pedestrian systems from around the country. The following locations were covered.

Arizona
- Phoenix
- Tucson

District of Columbia

California
- San Diego
- San Francisco
- Los Angeles

Connecticut
- Hartford
- Norwalk

SURVEY OF PEDESTRIAN ATTITUDES AND TRIP MAKING CHARACTERISTICS

9

Date _____ Time _____ Location Code. _____ Interviewer _____

Excuse me. I'm conducting a survey of people walking to and from _____ (or along _____ Road or in this neighborhood, etc.). It's part of research study on how to make walking safer and more convenient. Could I ask you a few brief questions about your walking habits?

1. What location are you walking to right now? ____
   1. Shopping
   2. Office/employment
   3. Home
   4. School
   5. Hotel
   6. Restaurant
   7. Entertainment/recreation facility
   8. Bus stop
   9. Other _____

2. Where are you walking from? ____
   1. Shopping
   2. Office/employment
   3. Home
   4. School
   5. Hotel
   6. Restaurant
   7. Entertainment/recreation facility
   8. Bus stop
   9. Other _____

3. What is the approximate distance you are walking? _____ mile(s) ____

4. What is the purpose of your trip? ____
   1. Recreation/exercise
   2. Go to/from work
   3. Shopping/personal business
   4. Medical/dental
   5. Visit a friend
   6. Eat
   7. School
   8. Other _____

5. (If not recreational) What is the reason you chose to walk rather than drive? ____
   1. Don't have/drive a car
   2. Enjoy walking
   3. Too short a distance to drive
   4. Costs less than driving
   5. Other _____

6. How often do you make this particular trip? ____
   1. This is the first time
   2. Less than once a month
   3. One to four times a month
   4. More than once a week

7. How would you rate the safety of your walk today? ____
   1) Excellent 2) Good 3) Fair 4) Poor

8. How would you rate the convenience or pleasantness of your walk? ____
   1) Excellent 2) Good 3) Fair 4) Poor

9. On the average, about how far do you walk outdoors in a day, assuming the weather is good? (record in miles) _____ ____

10. What specifically do you like about walking in this general area? ____
    1. Exercise
    2. No conflicts with vehicles
    3. Scenery/aesthetics
    4. Path is direct
    5. Quiet/relaxing
    6. Nice to be with other people
    7. Nothing
    8. Other _____

11. What do you not like? ____
    1. Traffic noise
    2. Amount of traffic
    3. Hard to cross the street
    4. Dangerous
    5. Inconsiderate drivers
    6. No sidewalk
    7. Inadequate signal timing
    8. Other _____ _____

12. What do you think could be done to make your walk safer or more convenient? ____
    1. Provide more sidewalk
    2. Improve/maintain sidewalk
    3. Provide separate pathway
    4. Provide a signal or stop sign where I can cross the street
    5. More walk time at signals
    6. Improve sight distance
    7. Better signing
    8. More/better Sidewalks
    9. Other _____ _____

13. Do you have any other suggestions on how pedestrian facilities could be improved, in general. _____ ____
    _____

14. Do you have access to a car? 1) Yes 2) No ____

15. Estimated age: 1) Under 20 2) 20 - 40 3) 40 - 60 4) over 60 ____

16. Sex: 1) Male 2) Female ____

Figure A-3. Sidewalk Pedestrian Survey Form

SHORT FORM FOR SITE INVENTORY - NCHRP 20-19

Site Type: _____ Site No.: _____

Observer: _____ Date: _____

Jurisdiction: _____

Location (Street name, cross street, etc.): _____

_____

Is this an example of good or bad design? _____

Describe: _____

_____

_____

In what way is this design feature particularly beneficial or detrimental to pedestrians?

_____

_____

_____

If it was a problem design, what could have been done to improve it? Think of both the physical changes that would have to be made and the institutional or legal changes that would be needed to back it up.

_____

_____

Other comments: _____

_____

_____

Attach a photograph or sketch of the treatment. Photographs are highly preferred. Color or black-and-white prints are desirable, but slides will be accepted.

Figure A-4. Site Inventory Form

Florida
- Orlando
- Jacksonville
- Tallahassee

Georgia
- Atlanta
- Savannah

Illinois
- Chicago
- Peoria
- Carbondale
- Bloomington
- Decatur
- Danville
- Normal

Iowa
- Iowa City

Louisiana
- New Orleans

Maryland
- Montgomery County
- Prince George's County
- Baltimore County
- Frederick

Massachusetts
- Boston

Michigan
- Detroit

New Mexico
- Albuquerque

New York
- Nassau County
- Suffolk County
- Westhampton Beach

Pennsylvania
- Beaver County
- Chester County
- Montgomery County

Rhode Island
- Providence

Virginia
- Arlington County
- Alexandria
- Fairfax County
- Charlottesville
- Fredericksburg
- Orange
- Norfolk
- Waynesboro
- Richmond

Washington
- Bellevue

Wisconsin
- Milwaukee

OTHER DATA COLLECTION

Other types of data were also collected to fill other needs. For example, one count was conducted of pedestrians walking in a parking lot. The particular parking lot had special pedestrian aisles explicity for pedestrian movement. The counts identified the utilization rate of the special aisles versus the vehicular driveways. The results are reported in Chapter 4 of the body of the report.

Additional surveys at office buildings were conducted in Fairfax County, Virginia. These were surveys conducted at the workplace for offices in four activity centers - Skyline Center, Tyson's Corner (2 sites), and Springfield. They were conducted in conjunction with another study, and special data tabulations were made for the purposes of this project. The results are reported in Chapter 3. Counts were also conducted in the Tramway Boulevard case study to document the percentage of pedestrians using the overpasses versus the street level crossings.

Finally, additional data tabulations were made from the Fatal Accident Reporting System. The purpose was to further refine and analyze the characteristics of suburban and rural areas. The results are included in Appendix C.

CASE STUDIES

In-depth case studies were conducted at 28 sites from across the country. The purpose of the case studies was to acquire information on the pedestrian systems of each area, with special emphasis on the institutional arrangements. Each site was visited, and contacts were made with local planners regarding the planning, design and implementation background. Photographs were taken to document site conditions, and, where possible, site plans, maps and other writen documentation were acquired.

The case study sites were selected based on leads obtained from various sources. In some cases, the research team members were aware of pedestrian facility projects or land development projects that had potential relevance to the study. A number of candidate case study sites were found during the site inventories conducted around the U.S. Other possible case study sites were recommended to the research team by NCHRP panel members or other professionals in the field.

The final case study sites were chosen to illustrate particular pedestrian planning and design treatments or implementation strategies that had been employed. The sites were selected with consideration of the following factors:

- Distribution of sites throughout the U.S., including the East, Midwest and West.
- Distribution among the eight site types.
- A variety of examples of pedestrian treatments for each site type, including some that were effective and some that were not.
- Ability to cite lessons learned from the case study that would help other practitioners in pedestrian planning, design and implementation.

Each case study presents information on the type of site and location, the nature of the pedestrian facilities, an evaluation of the facilities and a summary of the lessons learned. Site plans, photographs and information from project reports are included where appropriate. A list of the case study sites is as follows:

Residential development or planned communities

- Brandermill, near Richmond, Virginia - comprehensive pedestrian network with several design innovations and interesting implementation experience.
- Columbia, Maryland - a well known planned community from which many lessons can be learned.
- Claremont, California - established residential community with a redeveloped downtown oriented toward pedestrian needs.
- Fremont, California - comprehensive pedestrian network originally planned, but never completed due to institutional problems.
- Sun City, Phoenix, Arizona - mature retirement community in the Sun Belt.
- Chesterbrook, Tredyffrin Township, Pennsylvania - planned community where pedestrian amenities were selected in favor of additional recreational facilities.

Shopping centers

- Towne Centre, Danville, Illinois - attempt to prop up fading pedestrian mall with anchor shopping center.
- Oxford Valley Mall, Langhorne, Pennsylvania - unique pedestrian pathway constructed through large parking lot.
- Plymouth Meeting Mall, Plymouth Township, Pennsylvania - covered pedestrian walkway used to connect main mall building with satellite facility.

Office/industrial parks

- Maitland Center, Orlando, Florida - extensive pedestrian walkway system and landscaping.

- Bellemeade Office Park, Lyndhurst, New Jersey - lack of coordination pedestrian planning provides incomplete pedestrian network.
- Metro East Office Park, Prince Georges County, Maryland - example of missed opportunity to intergrate pedestrian facilities with nearby transit station.

Suburban activity centers

- Bethesda, Maryland - redevelopment with application of interesting zoning techniques.
- Ballston/Parkington, Arlington, Virginia - redevelopment of area around a rapid rail station.
- Tysons Corner, Fairfax, Virginia - often-mentioned example of neglect of pedestrians. Case study focuses on how Tyson's Corner has evolved and what could have been done to foster accommodations for pedestrians.
- Bellevue, Washington - has done substantial work in planning for pedestrian improvements in their downtown.
- Warner Center, Los Angeles - instituted a special plan ordinance governing the installation of pedestrian improvements.

Pedestrianized older suburban areas and small towns

- Montrose Shopping Park, Glendale, California - redeveloped retail area.
- Fredericksburg, Virginia - historic downtown with extensive streetscape improvements.
- Market Way, Doylestown, Pennsylvania - changing an often used "alleyway short cut" into a pedestrian oriented "street".
- Iowa City, Iowa - interesting integration of downtown enclosed shopping mall to an older downtown area.
- Decatur, Illinois - pedestrian improvements made to retain place in regional business economy.

Major arterial streets/strip development areas

- International Drive, Orlando, Florida - contrast between new and old commercial strip development styles.
- Normal, Illinois - major highway underpass for pedestrians; extremely high volumes.
- Tramway Boulevard in Albuquerque, New Mexico - four pedestrian overpasses constructed along with major arterial highway.

Mixed use developments

- Skyline Center, Falls Church, Virginia - major residential office and shopping complex with both positive and negative features.
- Town Center, Costa Mesa, California - integration of public amenities and pedestrian facilities in an office/shopping environment.
- Disney Village - hotel, shopping, office complex in Orlando; unique implementation setting but noteworthy for design aspects.

EVALUATION CRITERIA

Part of the site evaluations employed a fixed set of criteria. These criteria were determined to reflect attributes that one would expect an effective pedestrian system to possess. The criteria were based on past research and on experience by the project staff in evaluating pedestrian-related facilities in the field. The most noteworthy reports referenced in the formulation of the criteria were NCHRP Report 240, and A Pedestrian Planning Procedures Manual, both of which are referenced in the Bibliography. A candidate list of criteria were developed from these sources and from the knowledge of the research team. The key advantage of the criteria is that they serve as a good checklist to ensure that the evaluator has thought about all the aspects of pedestrian accommodations.

Originally, the criteria were to be called "criteria for success or failure" of pedestrian facilities. However, the terminology was modified to "evaluation criteria" in the early stages of the project. This was in response to some of the site inventories that had been done. It became evident that most of the sites could not be declared absolute successes or absolute failures. There were good elements to most of the sites that were felt to be ineffective pedestrian treatments and bad elements to most of those that seemed to be effective. The terminology "success or failure" was found to be awkward for many of the situations examined in the walking tours and site inventories.

We have also found that many of the problems with pedestrian facilities are the composite result of doing many of the little things wrong, such as omitted sidewalk links, traffic signal controllers and other obstructions placed in the middle of sidewalks, creation of a "sterile" pedestrian environment through inadequate landscaping, etc. We have found it awkward to refer to some of these situations as successes or failures. For example, it is awkward to refer to a "successful" median treatment for an arterial street or a "successful" crosswalk placement. Such things

are usually not dramatic examples of success or failure but are more appropriately referred to as examples of good or bad planning or design practice.

There are, however, some situations (usually major pedestrian projects) which could conceivably be appropriate to categorize as a success or failure. For example, an overpass system might be termed a success if people were using the facility, it reduced accidents, etc. A streetscape improvement project might also be considered a success if it resulted in increased use, more business for the merchants, etc. However, many of the "successful" projects also have their faults and many of the "failures" also have their good points.

It was concluded that it is not as important to classify the project as a success or failure (even if it could be done for every case) as it is to identify the planning, design and implementation ideas and possible pitfalls that are important for other practitioners to know. The criteria used to evaluate these projects are, of course, vitally important to distinguishing between good and bad planning and design practice.

As the study progressed, ways of further defining the evaluation criteria used in the case studies were evolved in an attempt toward formalizing the qualitative process used by the project staff in examining and evaluating site characteristics. A definition of each original criterion is given followed by a paragraph of commentary, explaining the approach to the definitions and indicating, to the extent possible, the meaning of "excellent, good, fair, poor" or "none, low, moderate, severe". Most of the definitions are descriptive, rather than quantitative. An effort was made to develop quantitative definitions earlier in the project, and these proved not to be practical in most cases, for reasons explained below.

The criteria are described below:

- Level of use by pedestrians. This criterion represents the volume of pedestrians measured over a given period of time. It is particularly appropriate when comparing the usage of the facility in question (e.g. an over/underpass, pedestrian aisles in parking lots or midblock pedestrian signal) with usage via alternate routes. Pedestrian volume (or density) is also a good indicator of the "liveliness" of a space which may have been intended to attract pedestrians for social or recreational reasons. Level of service concepts, based on volume or density, can also be employed as a tool for quantifying use.

It became clear at an early stage in the project that the method of evaluating level of use would vary, depending on the situation type. In some cases, effectiveness would be determined by the degree to which pedestrians use the intended facilities, as opposed to an alternate facility. This situation would exist, for example, with an over/underpass intended for pedestrian use. If most of the pedestrians are using the street level crossing rather than the over/underpass crossing, then the facility would have to be termed ineffective (unless one believes that the availability of the facility for the less agile pedestrians, who may not cross at street level, is still worthwhile). Other "alternate path" situations include special pedestrian aisles in parking lots and midblock pedestrian signals. Data on pedestrian usage of over/underpass facilities was used in the Tramway Boulevard case study to make an assessment of effectiveness. An evaluation scale could be devised that considered the percentage of pedestrians using the preferred facility that could have used it, such as:

- over 90 percent = excellent
- 70 to 90 percent = good
- 40 to 70 percent = fair
- less than 40 percent = poor

This was the general scale used for the Tramway Boulevard case study, but it was not appropriate for the other case studies.

Another type of situation is a pathway system, in which the ideal evaluation scale would be based on pedestrian volume. An initial attempt was made to develop such a scale with values such as:

- over 500 pedestrians per day = excellent
- 200 to 500 pedestrians per day = good
- 50 to 200 pedestrians per day = fair
- 0 to 50 pedestrians per day = poor.

Such a scale is obviously too simplistic, in light of the fact that surrounding land use most heavily influences trip volume, and the attributes of the pathway system play a less significant role (except possibly for recreational routes). An acceptable system would have to be devised for many different land use settings. A given volume level which might rate excellent in a low-density residential area might rate poor in a suburban activity center. In addition, the volume measure would need to represent not just one or two spot locations, but volume on the entire network. A measure such as pedestrian miles per mile of pathway would be the most appropriate measure, but collecting all the information to generate such a measure is not practical.

In light of the above difficulties with using a quantitative measure of volume, it was determined that qualitative descriptors would be adequate. The need to account for land use was included in the definition, but the selection of the effectiveness level was still largely within the judgement of the evaluator. In almost all cases the judgement was made on the basis of visual observation and on contacts made with individuals familiar with the site. The qualitative definitions are as follows:

- excellent - higher than would be expected for the land use setting. The pedestrian environment itself seems to be a generator of pedestrian use. Peak periods would normally find a continuous stream of pedestrians in densely developed areas and pedestrians regularly passing by in residential or very low density commercial areas.
- good - about the same number of pedestrians that would be expected given the land use setting. Pedestrians are generally visible throughout the day, especially in more densely developed areas.
- fair - the number of pedestrians is slightly less than would be expected given the land use setting.
- poor - the number of pedestrians is noticeably less than would be expected given the land use setting. There appear to be elements of the pedestrian environment that are keeping pedestrians away.

Accessibility. Is it possible for pedestrians to conveniently access the site? This does not relate to the adequacy of the pathway, but only to how well a site can be reached by walking. Topographical or man-made barriers inhibit accessibility. The presence of vertical grades or steps would also reduce accessibility. Accessibility for special groups would be included (e.g., curb ramps).

In light of the variety of topographical and man-made obstacles that can influence accessibility, it was quite difficult to formulate a scale that would adequately respond to all the factors. An attempt was made to formulate scales for certain design elements, such as curb ramps. For curb ramps, the following were listed as a possible scale:

- All curb ramps in place, properly sloped and at proper locations = excellent
- most curb ramps (over 70 percent) in place, properly sloped and at proper locations = good
- some curb ramps (30 to 70 percent) in place, properly sloped and at proper locations = fair
- few curb ramps in place, properly sloped and at proper locations = poor

The development of an adequate scale for other design elements related to accessibility (such as impedance due to vertical rise or fall in topography) is extremely difficult, and it is not possible to develop an overall quantitative scale. Nevertheless, accessibility is an important factor in the walkability of an area and should be included in the evaluation. The following was developed as a descriptive scale for accessibility:

- excellent - the pedestrian has a high degree of freedom of movement and encounters little impedance in walking from one place to another. Vertical grade changes are gradual, curbs are properly ramped, and roadways are easily crossed.
- good - a pedestrian encounters barriers infrequently, but they do exist.
- fair - the difficulty in accessing the site begins to be noticeable, due either to vertical separation, lack of curb ramps, more circuitous routes than necessary, or other barriers within and on the periphery of the site.
- poor - difficulty in accessing the site on foot is clearly evident and becomes the dominant characteristic of the site.

- Continuity of path longitudinally (along the roadway or between pedestrian magnets). Is there continuous provision for the pedestrian to walk on a paved surface (or other surface specifically intended for the pedestrian) without having to walk in traffic? Continuity varies by degree, ranging from having sidewalks and walkways over the entire length between pedestrian magnets, to having a few (or many) missing links along the way, to having no pedestrian provisions at all.

While no specific measurements were made of the percentage of the pathway system in place, the case study evaluators could readily determine by observation approximately how much of the pathway system was provided. The following represents the general scale employed, expressing continuity as the estimated percentage of pathway provided.

- 100 percent of pathway in place = excellent
- over three fourths of the pathway in place = good
- one half to three fourths of the pathway in place = fair
- less than half of the pathway in place = poor

It should be noted that the above scale is dependent on what are defined as the essential elements of a pathway system. In some cases, an adequate shoulder may constitute part of the pathway. In other cases a complete sidewalk system or separated network may be warranted.

- Continuity of path laterally (across the roadway). This is treated separately from longitudinal continuity, as it represents the degree of difficulty encountered in crossing the highway, which is usually the most significant barrier along the pedestrian route. Lateral continuity is best where no at-grade crossing of a traffic stream is required but, ideally, introducing minimal vertical grade change. For at-grade crossings, lateral continuity is better when street widths are narrow (or when wide streets are well-channelized), speeds are slow, and adequate signal timing exists.

The scale for lateral continuity must respond to all the design and operational elements that impact on a pedestrian being able to safely and conveniently cross the street. Each element would have to be examined in its own right first, and then a composite scale developed. In the initial stages of the project, an attempt was made to develop a scale for individual design and operational elements (e.g. crosswalks, signalization, channelization), but it quickly became evident that this would be impractical. In the end, the design and operational elements impacting lateral continuity became a checklist for the evaluator to be reminded of in developing the overall rating for this criterion. A descriptive definition of the scale is as follows:

- excellent - full grade separation of pedestrian/vehicle routes or an at-grade system in which street crossings are especially convenient and safe by virtue of narrow and/or well-channelized streets, slow traffic speeds, and signal timing conducive to pedestrian crossings.
- good - street crossings throughout most of the area are excellent, as defined above, but there are several key points at which street crossings are more difficult.
- fair - the system is noticeably deficient in providing a continuous, convenient path across streets within or adjacent to the site, but this deficiency does not exist throughout the system.
- poor - deficiencies exist throughout the system in assisting pedestrians across the street. The area is essentially auto oriented.

- Pedestrian delay. Is the pedestrian's trip unnecessarily lengthened by lack of facility capacity, traffic flow/circulation patterns, signal timing, etc.?

An attempt was made to quantitatively define this aspect of the pedestrian system evaluation. A scale was devised representing a percentage increase in trip time, as shown below:

- less than 5 percent increase in trip time due to signals, traffic volume, etc. = excellent
- 5 to 10 percent increase in trip time = low
- 10 to 25 percent increase in trip time = moderate
- over 25 percent increase in trip time = severe

The major problem with such a scale is that it needs to incorporate an assessment of many different routes to the site. Delays occur at numerous points throughout the system, and it is not practical to combine all of the spot delays into one comprehensive measure. For many of the sites there is almost an infinite number of approach routes, and adequate data could not be collected to support such a measure. Developing the data base would require extensive studies of trip time, signal delay, gap acceptance, etc. The descriptive definition of the scales used for this criterion are as follows:

- none - few pedestrians have to wait anywhere on the system.
- low - brief delays at traffic signals and momentary waiting to cross at unsignalized locations
- moderate - waiting time to cross at certain locations is noticeable and has begun to be an irritant to pedestrians
- severe - delays are widespread and severe, with waits of perhaps one minute or more at some locations.

- Level of pedestrian hazard. What is the accident risk associated with walking in a given area? Certain types of situations have been identified as having greater accident potential than others. Areas with conspicuity or sight distance problems and locations where drivers and pedestrians have many competing demands for attention typically produce the greatest hazard levels. Higher speeds and lower lighting levels also increase the hazard.

An attempt was made to develop an accident-based scale for this criterion. It is important that accident characteristics be evaluated on an exposure basis, so that the relative amount of pedestrian and vehicle travel is taken into account in developing an index of relative hazard. Just because fewer accidents occurred at a given location does not necessarily mean that the location is safer than another. Higher pedestrian and/or vehicle volumes may have been the reason that more accidents occurred. Although accident data provide helpful information in developing a general picture of the safety problem, pedestrian accidents are usually too infrequent to enable accidents to be used as a reliable scaling factor for the case studies. The collection of all the accident data and pedestrian and vehicle volume data necessary to support the measure was also not possible within the scope of this project. Therefore, the following descriptive definitions were developed:

- none - points of pedestrian/vehicle interaction are either minimal or are well-controlled, with good sight distances, well-disciplined traffic movement, and good lighting.

- low - there may be several locations where the potential for accidents is increased, but most crossing points are low risk

- moderate - a feeling of insecurity begins to be felt by pedestrians as they encounter numerous crossing points where the risk is increased

- severe - at this stage, the area has typically gained a reputation as a high-hazard location to walk. Traffic movements are poorly disciplined, and the pedestrian can more easily be visually lost in the midst of the usually intense vehicular activity.

Degree of conflict with vehicles. This is related to several of the other criteria, but represents a slightly different perspective. It represents the volume of traffic that must be crossed and the level of comfort associated with crossing it. Minimizing the number of conflict points through road and pathway planning can reduce vehicular conflict.

- none - little conflict with vehicles (e.g. overpasses provided and/or crossings are primarily of low volume streets)

- low - at-grade conflicts exist but are held to minimum

- moderate - more conflicts exist than are necessary

- good - many more conflicts exist than are necessary

Clarity of directional information for pedestrians. Is it clear to the pedestrian, through signing or other visual cues, what is the most direct and safe route by which to enter, exit and/or traverse a site or to find his or her way to the eventual destination? Also, is it clear to the pedestrian what is expected in terms of walking behavior (e.g, where to cross a street) or in the use of mechanical or electronic devices (e.g., push buttons at traffic signals). The street environment needs to reinforce educational information received from other sources.

- excellent - signing and/or other information is provided at pedestrian approaches as well as vehicular approaches to the site and internal to the site. This information is reinforced by the layout of pathways, location and design of building entrances, etc.

- good - less signing is provided but directions into and out of the site are reasonably clear.

- fair - some pedestrians may become confused when approaching the site from certain directions

- poor - there is a definitive lack of information on how to find destinations internal to the site or on the periphery to the site.

- Directness of pedestrian path. Are the pedestrian accommodations on the path that the pedestrian would be expected to take? For non-recreational trips, pedestrians will tend to take the straightest line between two points. Failure to take this tendency into account will often render the facilities unused.

This criterion is amenable to a numerical scale up to a point. An initial concept was the development of a circuity ratio (actual walking distance divided by airline distance). A circuity ratio can be developed for any given approach route, but one site encompasses many approach routes. Ideally, a circuity ratio would consist of a weighted average of individual route circuity ratios, with the weighting done by pedestrian volume. Developing this overall measure is not practical, in light of the data necessary to compute it. However, the case study site evaluators had a general impression of route directness, and the following values come reasonably close to describing it:

- circuity ratio less than 1.1 = excellent

- circuity ratio 1.1 to 1.3 = good

- circuity ratio 1.3 to 1.8 = fair

- circuity ratio over 1.8 = poor

- Clarity of information provided for drivers. Are drivers aware from the street geometry or signing what their responsibilities are in terms of recognition of and yielding to the pedestrian?

  - excellent - reminders are consistently present, in terms of signing, pavement markings or geometric design that pedestrians can be expected in the area

  - good - information is present, but may be missing in a few key locations

  - fair - information is spotty, but present at some of the major locations

  - poor - there is clearly a lack of recognition of pedestrian presence

- Aesthetics and environmental quality. This criterion has to do with the aesthetic appearance and scale of the pedestrian space. The absence of litter is just one of many factors responsible for creating a pleasurable walking environment. Landscaping, paving material, scale of buildings, street furniture, pathway location (lateral separation) and alignment (straight or meandering), and other factors combine to determine whether the setting is an enjoyable place to walk. The pedestrian facilities should not be, as highways usually are, a place for merely passing through. Although this criterion is more subjective than some of the others, it represents an important facet of facility planning and design.

This criterion was perhaps the most difficult for which to develop a reasonable scale. Although there are some common elements to look for in good aesthetic planning and design, effectiveness is often in the eye of the beholder. The case study evaluators had a good appreciation of the important planning and design elements. The more elements present, the higher the rating.

- Security. Is the walking area reasonably safe from crime and vandalism? Completely secluded areas will be more susceptible to this. Lighting levels are also a factor.

Crime and vandalism statistics were not obtained for the case studies. However, local staff appeared to have a good appreciation of the security problem, and the assessment was based primarily on information provided in the course of the contacts. Descriptive definitions are as follows:

  - excellent - no report of crime or vandalism activity
  - good - crime may be perceived as a minor problem but there is little actual evidence of it.
  - fair - occasional incidents of crime or vandalism have been noted in the area.
  - poor - a major, actual security problem exists, indicated both by actual occurrences and by local perception. At this level, the site has a well-known reputation for security problems.

- Overall "friendliness" of pedestrian environment. This criterion encompasses many of the other criteria, reflecting the overall sense of it being a welcome area for pedestrians. Certain environments have a cold, sterile feeling, while others are enjoyable and "friendly."

Like the aesthetic criterion above, friendliness of the environment is one of the more subjective criteria for which definitions were needed. Often, it is a sense one has of how enjoyable it is to be walking in a certain place. The simple ratings of excellent, good, fair and poor are believed to be adequate without further elaboration. In many cases the friendliness of a site is quite evident, and different evaluators would derive close to the same judgements.

The case studies are presented in Appendix B in the order that they were listed earlier.

PROBLEM AND SOLUTION IDENTIFICATION

An important part of establishing the specific issue areas to be addressed in the project required the clear identification of problems that needed to be solved. The problems included not only the design issues, but also those related to implementation, including planning processes, funding arrangements, laws and ordinances, and various institutional problems that inhibit the provision of well-conceived pedestrian facilities.

Pedestrian-related problems were identified from a number of sources, including the literature, agency surveys, focus group interviews, site inventories and personal knowledge of the research team members. They were classified into a number of problem areas. Later in the project, possible solutions were identified for each problem area. The solutions were derived from the literature, including foreign experience, from brainstorming sessions by the research team staff, and from functionally analyzing the problems identified. Functional analysis is a simple technique for arriving at basic conclusions through a logical, systematic analysis of the function a certain device, practice or procedure is to serve. This was done to generate several of the potential solutions. Some 200 solutions were identified, and the more promising ones are listed in Table 3 in the body of the report.

APPENDIX B

CASE STUDIES

SITE TYPE AND LOCATION

Brandermill is a 2,500 acre planned unit development, approximately 10 miles southwest of Richmond, Virginia. Built on a lake, Brandermill currently contains approximately 2,500 occupied dwelling units. The community is divided into neighborhoods, each known by its own name. Five of the neighborhoods consist of multi-family townhouse units, but the vast majority are single family detached units. The project was initiated in 1973, and several of the neighborhoods are still under development.

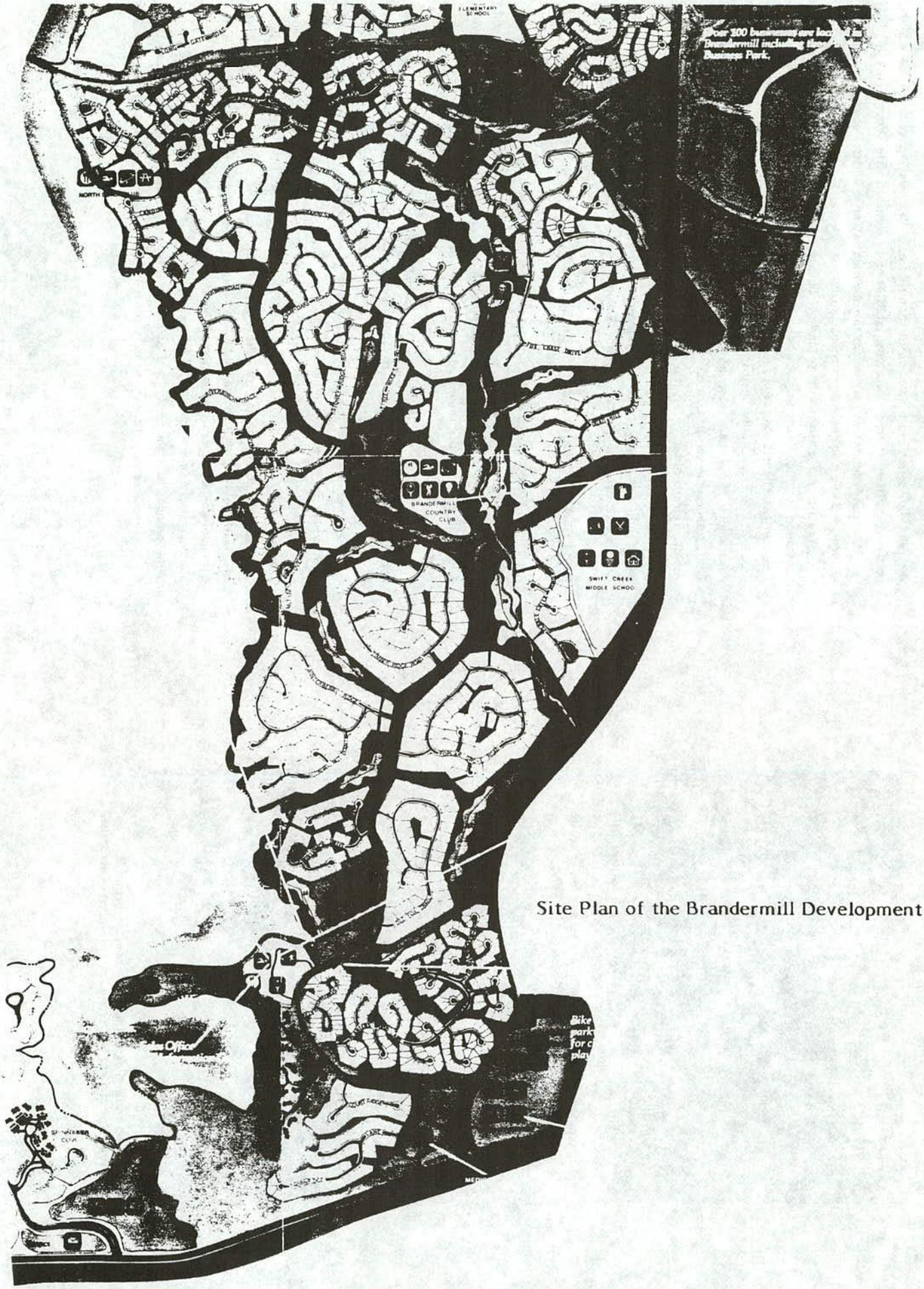
There are two primary areas of commercial development in Brandermill. At the south end, Market Square is the commercial center, with a Safeway store, drive-in bank, drive-in savings and loan, convenience food mart, drug store, several small offices and a variety of small shops. Total floor space in Market Square is approximately 85,000 square feet. The Medical Center (16,600 sq. ft.) and a small computer firm are also located in the south end.

At the north end is located the Brandermill Business Park, a cluster of businesses near the intersection of Old Hundred and Genito Roads. The business park contains approximately 63,000 square feet of occupied floor area. There are also extensive recreational facilities throughout Brandermill, including a golf course, tennis courts, swimming facilities and several lakeside recreation facilities.

The Brandermill population could be characterized as a young to middle aged professionally oriented community, but with a significant retired population. The median home value reported in the 1980 census was $81,100, high for the Richmond area.

DESCRIPTION OF STREET SYSTEM AND PEDESTRIAN FACILITIES

The following page provides a site plan of Brandermill, showing the mix of land uses and the overall layout of the development. The neighborhood roadways are all two-lane, and are winding in nature, designed to reduce vehicular speeds. The setting is highly rustic and recreational in nature, with pathways connecting many of the neighborhoods and linking some of the neighborhoods to commercial activities. Pathways are shown by dotted lines on the map. Pathways along the major road facilities are separated from the road approximately 20 feet. They are visible from



Site Plan of the Brandermill Development

Some pathways, like this one, parallel the major roads; others connect neighborhoods

Special walkway treatment at shopping center.
Note "speed hump" for vehicles and walkway across it.

the road, but separated by a strip of mature trees. Walkways pass under the major roadway facilities at three locations, facilitating convenient, safe access. Within the neighborhoods themselves pedestrians use the roadway or shoulder, but traffic volumes are low, and vehicles generally proceed slowly.

Traffic movement within Market Square, the main commercial area, is controlled through parking lots with landscaped islands and special driveway treatments. These treatments are employed on the main driving aisle in front of the grocery store. Essentially, they are over-sized speed humps, requiring vehicles to slow down and to cross the pedestrian walkway at a level even with the top of the curb. Thus, rather than the pedestrian having to traverse the street at vehicular level, the vehicle is required to cross the pedestrian path at sidewalk level. In effect, this reorients the perceived right-of-way more toward the pedestrian. However, as with many similar walkway treatments in parking lots, pedestrians tend to walk in the driving aisle even though the special walkway is provided.

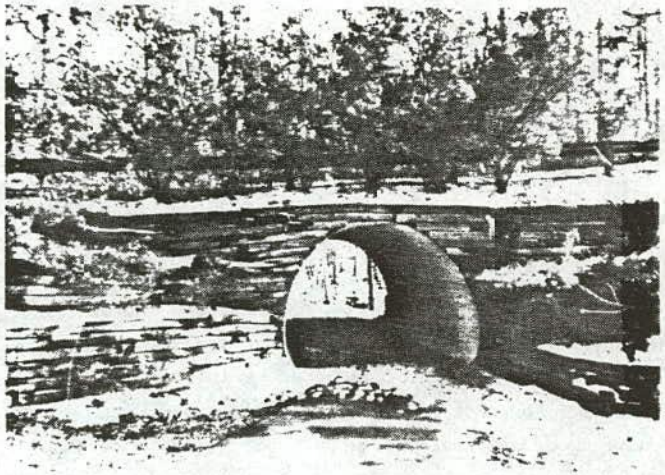
IMPLEMENTATION AND FUNDING BACKGROUND

Needless to say, Brandermill has been given consicerable attention in the planning stage from its outset. A master plan, prepared by the developer and approved by county planners was developed incorporating the various features described above. The county specifically requested a master plan of the pathway system as part of the approval process.

According to the planners of Brandermill, the pathway system was modelled after the leisure trail concept. It was intended primarily for recreation, and does not provide as direct connections between residences, shops and schools as might have been possible. In fact, little consideration was given for the major pedestrian crossing of Millridge Parkway into Market Square.

All pathways are four feet wide and asphalt surfaced. Four feet has apparently been adequate, with a few exceptions. In several locations, the pathway must also accommodate golf carts, and could have been wider there.

The pathway system was laid out in conjunction with the drainage plan, to minimize costs. Several pedestrian connections were planned between homes at mid-block locations or at the end of cul-de-sacs to shorten walking distances between neighborhoods or community facilities. Usually, the connections were placed in a drainage easement. The easements were widened in some locations (to at least 20



A typical pedestrian tunnel.

This entrance treatment to one of the neighborhoods slows vehicles and provides a distinctive appearance.

feet) to accommodate what was believed to be an ample width for the pedestrian connection.

In addition, the pedestrian tunnels were also part of the drainage system plan. In addition to serving pedestrians, they also become floodways at times of peak run-off. A drainage pipe one foot below each tunnel accommodates normal runoff. The tunnels were not particularly expensive in the first place (estimated at $10-20,000 each) and with dual use, the marginal cost for accommodating pedestrians was almost negligible, considering the total project cost. The primary disadvantages of the dual use are that the paths may not have crossed roadways exactly in the most convenient location and that ice more readily collects during the winter months.

One of the interesting implementation problems experienced by the builders has to do with the timing of pathway construction. There are several missing links in the Brandermill pathway system. These occurred where residents had already purchased homes but the pathway was not yet complete. When attempts were made to construct the pathway, residents objected on the grounds of reduced privacy. These areas were no different physically from locations where the pathway was in place prior to the residents moving in. No objections had been encountered from these residents, since the pathway was a known entity when they purchased their home. The missing links have had to be accommodated by directing pedestrians to use the local street system.

All facilities within the development were funded by the developer, including road improvements. A strong community organization, funded by dues from the residents, provides a community newspaper and keeps residents informed of events and community activities. The map of the pathway system is reprinted periodically and distributed to the residents. Maintenance of the common areas within Brandermill, as well as certain community support facilities, are also funded from this source. An architectural advisory board reviews new construction plans for homes and other facilities, to ensure compatibility with the overall design philosophy.

EVALUATION OF FACILITIES

Travel surveys of Brandermill residents indicate that approximately 15 percent of all trips made to or from home are for recreational purposes. Most of these trips are auto trips by those taking part in golf, tennis and other sports activities. Opportunities for recreational walking and biking are abundant, and it is apparent that much of this occurs. The pathways are popular biking routes especially for the children.

One of the disappointing, but not necessarily surprising, findings of the travel surveys in Brandermill is that very few of the utilitarian trips are made by walking. For example, less than five percent of trips to the commercial center of Brandermill (Market Square) are made by walk or bike, even with this "ideal" pedestrian setting. Except for recreational walking and jogging, travel within Brandermill is still largely auto oriented. The only plausible explanation for this is that the walking distances are too great to make walking practical for most of the residents. This is due primarily to the low density nature of the residential development. This deficiency might have been partially remedied by locating the higher density dwelling units closer to the commercial center or relocating some of the retail activity closer to the residences. However, relocating the commercial activity away from Route 360 would be difficult since merchants derive some patronage from traffic passing by the facilities on this major arterial street. Pedestrian paths could also have been more direct in certain cases.

Walking to work was just as rare as walking for personal business. Although approximately 40 percent of those who work in Brandermill also live in Brandermill, only about 10 percent of these walk to work. Again, the relatively remote location of work places and the "automobile mentality" are the primary factors.

The recreational facilities are better located for pedestrian linkages than the commercial activities. These are apparently seen as more compatible with the residences and more capable of being integrated with them. Suitable walkways are also provided to the schools, but surprisingly little pedestrian traffic was noted in the observation of access to the schools. The crossing of major streets by children and perhaps some security concerns may be the most significant factors. Security problems are almost completely perceived and not real. The only problem noted by the planners was an "ambush" setup at one of the tunnels by/for fellow students.

According to data collected by sales personnel, the pathway system is one of the most popular features of Brandermill. Approximately three-fourths of the home buyers report that they use the bike/pedestrian path frequently.

The following is a summary evaluation based on the defined set of criteria.

- level of use by pedestrians - good, but mostly recreational.
- accessibility - excellent to residential facilities; fair to other facilities.
- continuity of path longitudinally - good; only a few missing links.
- continuity of path laterally (across the street) - excellent except for Market Square area.
- pedestrian delay - none.
- level of pedestrian hazard - none.
- degree of conflict with vehicles - none.
- clarity of directional information for pedestrians - good; more pedestrian-oriented signs would help.
- directness of pedestrian path - better than most communities but fair for utilitarian trips.
- aesthetics and environmental quality - excellent.
- security - good; there are some secluded areas, but security does not seem to be a problem.
- overall "friendliness" of pedestrian environment - excellent; pathways significantly add to the quality of the residential environment.

SUMMARY OF LESSONS LEARNED

Brandermill contains several unique design features which could be considered for incorporation into many other communities. Street design and some of the special treatments designed to reduce vehicular speed are quite effective and create a safer, more pleasant walking environment. Given the constraints on location of land uses, it is doubtful whether a much better job could be done in overall site planning. It is evident that a planned unit development provides much more flexibility in design and provisions for the pedestrian than traditional planning and zoning practice. Where other PUD's can be developed, Brandermill serves as a good example to follow. However, where there are opportunities to more centrally locate some of the commercial activities, this should be given high priority. Brandermill is largely auto oriented because of the distant spatial relationship between many of the pedestrian magnets. Brandermill also points to the importance of integrating recreational facilities with the residences.

In the development of pedestrian linkages, it is important to think through the pathway system in the early stages of planning. This makes it more likely that adequate right-of-way can be devoted to the pathway system to make it more direct. Developing the pedestrian system in concert with the drainage system is an excellent

idea if the system is to serve primarily recreational trips. It will rarely be effective for utilitarian trips, however. It is important to have a group or a planner designated as an advocate for the pedestrian to ensure that coordinated, continuous facilities are provided.

Major developments such as Brandermill tend to evolve over a long period of time. The financial and market conditions can often dictate the feasibility of developing various portions of the property at certain points in time. If certain sacrifices need to be made to address the short term needs to make the project feasible, this must, of course, be considered. However, it can be concluded that the possibility exists of the system being incomplete if residents purchase homes before the pathway is built. Therefore, timing should place the construction of the pathway prior to sale of homes near the path.

COLUMBIA NEW COMMUNITY, HOWARD COUNTY, MARYLAND

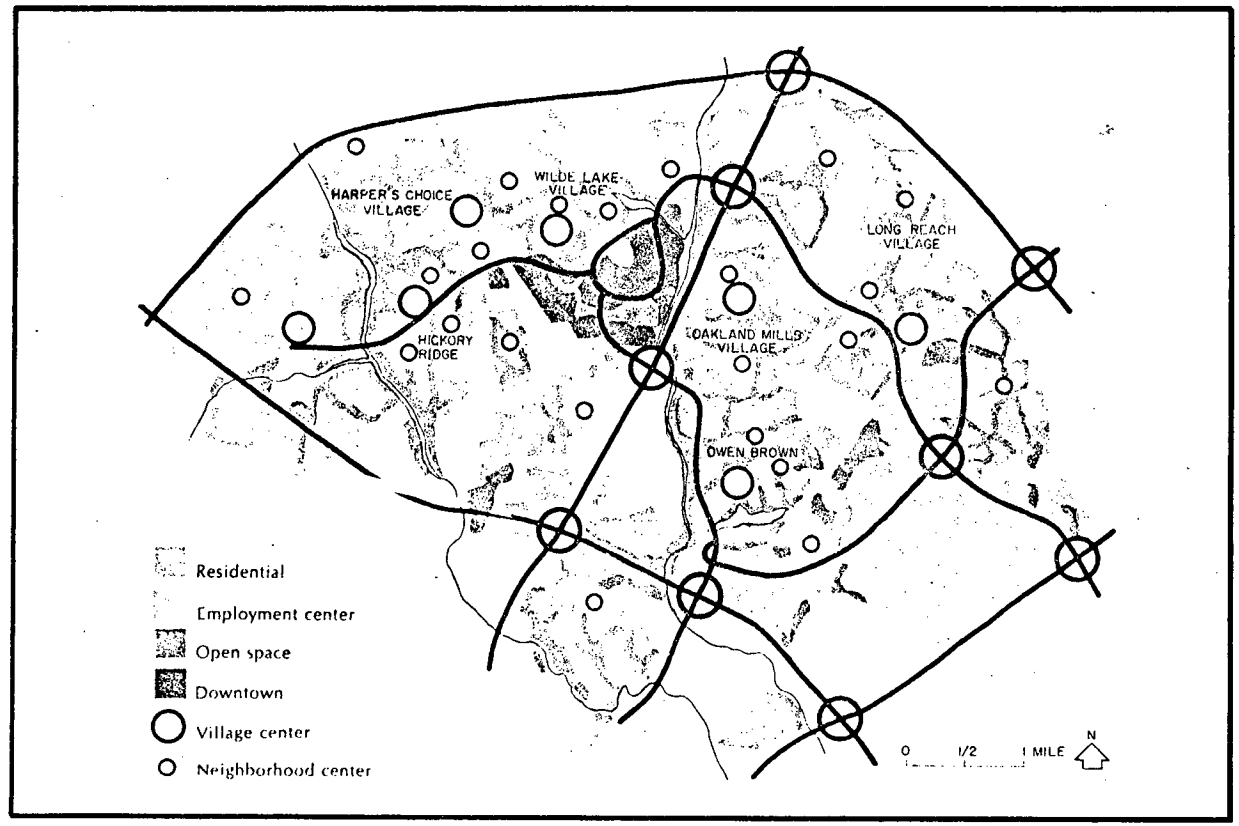
SITE TYPE AND LOCATION

Columbia is a 13,700 acre new community located in Howard County, Maryland almost midway between Baltimore and Washington, D.C. The community is located on both sides of Route 29 from approximately Route 28 on the north to Route 32 on the south. Columbia was begun in 1962 when the first property was acquired. It is conceived of as a total community, incorporating living, shopping, educational, employment, recreation, and cultural/community facilities, planned for approximately 100,000 people. Today, its current residing population is approximately 63,000, and approximately 38,000 people are now employed in Columbia businesses. The community has set aside over 2,300 acres of land for parks, playgrounds, path systems and open space.

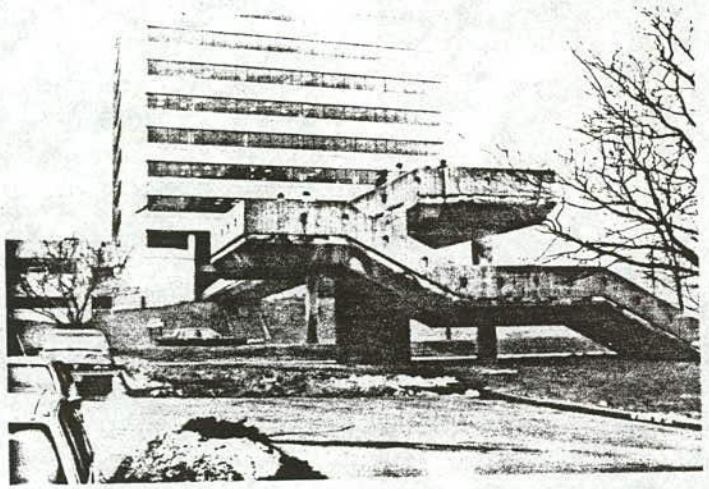
DESCRIPTION OF PEDESTRIAN FACILITIES

The following page presents an overall land use plan for Columbia. The concept of Columbia is a system of overlapping and mutually supportive sub-communities of varied scales from the housing cluster, to the neighborhood, to the village and finally the town, each with its own community, educational, or shopping facilities in a center related to it. Ideally this allows a high percentage of walking and bicycle trips to local schools and shopping. The overall movement system was designed to move people and vehicles between these various sub-communities and their centers with minimum confusion, and to satisfy both safety and aesthetics.

The pedestrian facilities concept is one of walkway spokes connecting village centers and leading to the town center. Inherent in this concept was the desire to separate, to the extent possible, pedestrian movements from possible automobile conflicts. To this end, a considerable number of pedestrian underpasses or overpasses were installed leading to the village centers, and one overpass installed to connect the regional shopping center to the lakefront office and community area in town center. (See photographs)



Diagramatic Land Use Plan



Pedestrian Bridge Between Shopping Mall Area and Lakefront Office Area

Lunch Hour Pedestrian Traffic

Pedestrian walkways were sometimes located parallel to the arterial road system, within the R.O.W., but separated from the curb by 10 to 15 feet. More often these walkways were consciously placed in open space areas, in ravines, or along amenities such as a lake, away from nearby streets, to provide a more pleasant walkway experience. This location frequently left most streets without sidewalks or intersections without crosswalks, since the major crossing of traffic was expected to be grade separated.

IMPLEMENTATION BACKGROUND

Columbia was initially planned by and continues to be developed by Howard Research and Development (HRD), a corporation jointly owned by Connecticut General Life Insurance Co. and the Rouse Co. As the land developer, HRD has always been responsible for building the basic infrastructure of the community including some sidewalks next to streets it develops, and the path system in common open areas.

In order to keep initial development costs to a reasonable level HRD has operated under a concept of building parts of the total system incrementally in conjunction with adjacent land sales and building construction. This concept implies that the overall pedestrian system is not complete or continuous until development of the community is complete, a 20 to 30 year process. Furthermore, this process allowed HRD to initially propose to Howard County that sidewalks along major thoroughfares would not be provided where there was an alternative attractive route fairly close by, usually in an open space area. Howard County initially accepted this concept.

As Columbia has matured, however, three additional groups have become involved in path/sidewalk construction or maintenance: the County, the Columbia Association, and individual commercial property owners. First, the County has begun to retrofit some existing major streets with sidewalks and is currently considering requiring, through its subdivision standards, sidewalks on all new streets. The County only maintains county facilities that include some sidewalks and the special county bicycle trail. Second, the Columbia Association (C.A.), a property owners association, has stepped in to build a few additional pathway links to create more continuity of the pedestrian system where development has not yet occurred, especially in commercial areas around town center and the shopping mall. These links will be considered

"temporary", to be replaced when final development does occur. C.A. has the additional responsibility of maintaining all the C.A. owned recreational paths in the community, which amount to approximately 45 miles in length. C.A. is funded by an annual property assessment to all property owners in Columbia. Third, individual property owners often install walks or paths within their own projects that sometimes help an off site user traverse the property. Property owners are responsible for the maintenance of public sidewalks adjacent to their properties.

EVALUATION OF FACILITIES

Public use of Columbia's pedestrian facilities has varied by numerous factors. Location of the facility, time in the development process, and the trip purpose all have an impact, as do other variables.

In the first decade of development, HRD believes that approximately 75 percent of all school children walked to multiple small scale neighborhood schools because distances were short and no real alternatives existed. Additional pedestrian trips to the same neighborhood center location for convenience shopping or recreation also existed. This situation changed some in the 1970's, as state and federal aid for new school construction diminished and smaller families meant fewer new schools and the need for busing. In addition, as Columbia grew, the establishment of a public mini-bus system also gave children an alternative mode of transportation to school.

Likewise, some pedestrian trips existed to the village centers, where a grocery store or middle school or church would be located. However, HRD believes that there is not substantial pedestrian traffic to the village centers because the car is still too convenient, that the typical grocery shopping trip requires a car, and over time residents have developed fears for safety in using some parts of the pedestrian system. In particular, grade separated pedestrian underpasses are hardly used at all, because the path is visually out of sight. Overpasses fare a little better, especially where a grade transition to the destination must be made anyway. Paths in visually remote areas are underutilized. General feelings of safety on the open space paths are rated by surveyed residents[1/] in the fair to good range, which indicates some level of concern.

1/ Survey of Columbia residents by JHK & Associates.

In terms of pedestrian trips from housing to employment zones the results are mixed. Even though the pedestrian system was originally intended to link various parts of the community regardless of distance, it has only minimally succeeded. A survey of residents indicates less than six percent walk to work, and another four percent bicycle.

On the other hand the recreational pedestrian trip in Columbia seems to be the biggest success of all. Eighty-two percent of adult residents[1/] walk at least several times for recreation (average distance is reported to be about two miles). About one-third jog several times a week on the open space paths or sidewalks (average distance is about three miles).

The major problem identified by HRD in providing pedestrian facilities that would be heavily used in a suburban setting such as Columbia is the lack of predictability of origins and destinations. Because overall development densities are low (2.2 DU/ac), because development happens in a non-adjacent, spotty pattern, even within a planned community like Columbia, and because there is so much space surrounding buildings (unlike urban downtown areas), the number of straight line pedestrian paths between two points approaches infinity. The need to consolidate these multiple paths into controllable, safe locations has not yet been totally solved by Columbia.

The following is a summary evaluation of Columbia facilities based on the defined set of criteria:

level of use by pedestrians - moderate for trips to neighborhood center, minimal for trips to employment centers or town center. High use for recreation.

accessibility - excellent; the pedestrian system touches all parts of the community.

continuity of path longitudinally - good; the last year has seen the implementation of some important links for continuity into or through town center.

continuity of path internally (across the roadway) - excellent for grade separated solutions, fair for more standard pedestrian crosswalks.

pedestrian delay - low; no unreasonable delay except where discontinuity or non-direct paths exist.

level of pedestrian hazard - moderate; pedestrians not using the grade separated facilities risk traffic crossings at unmarked, unsignalized points. Pedestrians using street intersections face non-existent crosswalks, high speed free right hand turn lanes and no "walk" cycle on traffic signals.

1/ Survey of Columbia residents by JHK & Associates.

directness of pedestrian paths - fair; early dependence on open space recreational path system limits directness to pedestrian attractions like employment centers and shopping mall. Directness is more successful at neighborhood level.

aesthetics and environmental quality - excellent.

security - fair to good; crimes have occurred in visually remote open space and pathway areas.

overall "friendliness" of the pedestrian environment - fair to good, with the best conditions relating to the recreational trip.

SUMMARY OF LESSONS LEARNED

The major lessons Columbia presents are:

1. Sidewalks should be provided along all types of streets, in conjunction with some areas of open space where feasible. This would allow greater visual surveillance of the path and open space areas and make these areas part of the visual impression of the environment being created.

2. A pedestrian system intended for work, school or convenience should be as direct as possible and visually secure at all times. Provide crosswalks at all intersections, even non-signalized ones, and do not depend upon grade separated crossings unless dictated by topography and adjacent high density development.

3. Open space/recreational path systems are a valuable community resource but not in lieu of secure, direct and continuous walks to major community attractions. With less energy and development dollars put into open space path systems, more would be available to make the other connections in the community successful.

4. In planned suburban areas where pedestrian trips are desired, an increase in densities, both residential and commercial, will make the trips more feasible. In addition, planning these types of suburban areas from the beginning with streets, sidewalks, and urban intersections will make the transition to future increased density and pedestrian trips easier and safer to accommodate.

CLAREMONT, CALIFORNIA

SITE TYPE AND LOCATION

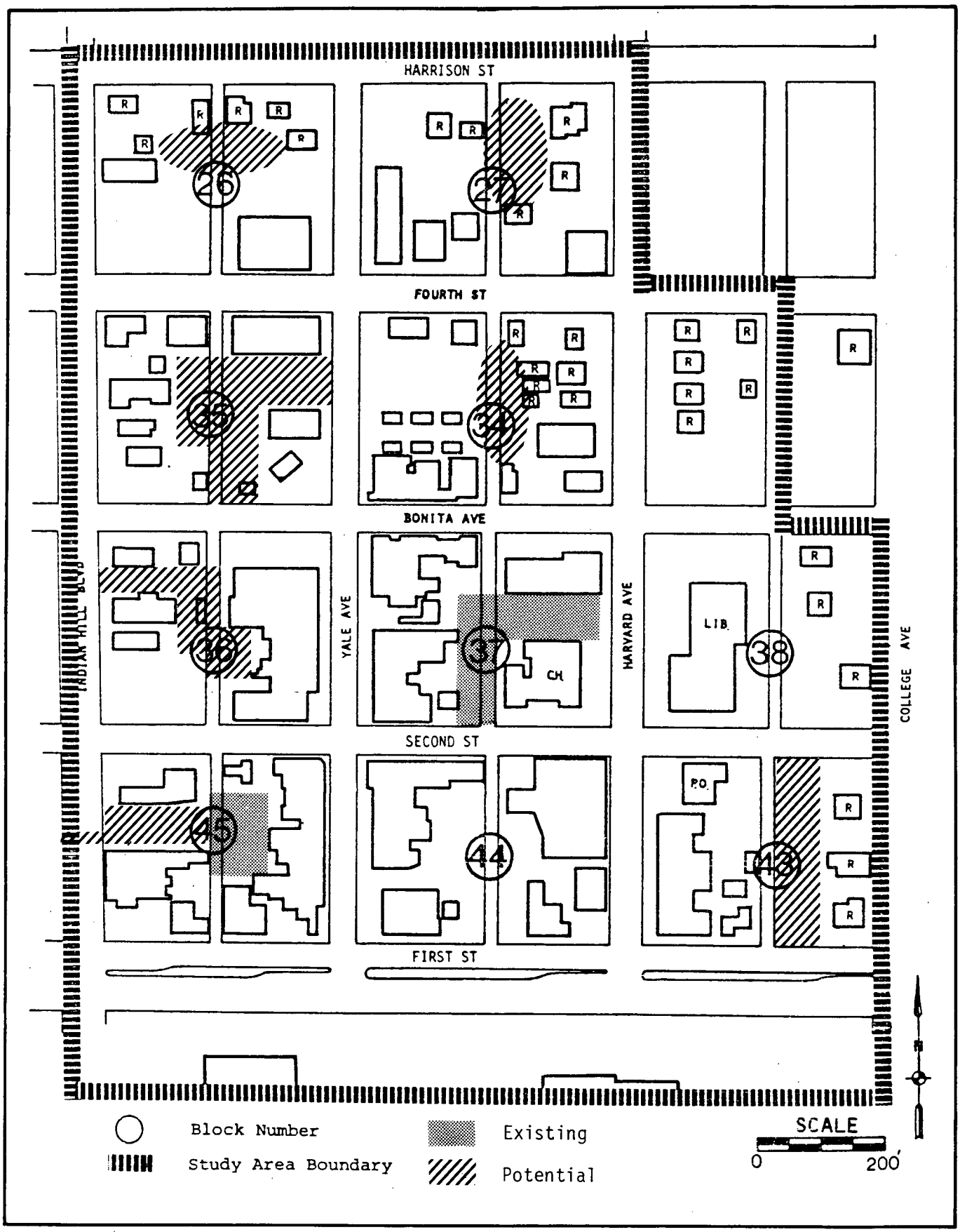
Claremont is an established residential community with a population of approximately 35,000 persons, 40 miles east of Los Angeles. The city was incorporated in 1907 and encompasses an area of approximately 7.5 square miles.

Perhaps the most distinct characteristic of Claremont is its being the home of a confederacy of six colleges, including Harvey Mudd College and Pomona College. Development began accelerating in the 1950s, and the city is almost completely built-out. The figure on the following page shows the general layout of the street system and location of public facilities.

DESCRIPTION OF STREET SYSTEM AND PEDESTRIAN FACILITIES

Claremont is an attractive walking environment in both its residential and commercial areas. The central business district, known locally as "The Village" is an area of approximately three square blocks. City Hall is located in the village, as well as a number of smaller offices and a typical array of retail facilities and restaurants. One of the design goals within the village is to locate parking in the interior of the blocks. These interior parking lots and on-street angle parking constitute most of the parking supply. The first of these parking lots was constructed in the early 1950's, funded by a parking assessment district. More recently, the Claremont Redevelopment Agency (CRA) has taken on the parking responsibilities as well as broader redevelopment goals.

A major project undertaken by the CRA in the early 1970s was a modification of the streetscape in the CBD. Over the years the Village had become a depressed area and there was fear of competition from the development of a shopping center at nearby Montclair Plaza. The existence of a rather large pedestrian population made the idea of revitalizing the Village that much more attractive. The streetscape project included additional street trees, street furniture, new street lighting, selected bulbing and widening of the sidewalk, and special crosswalk treatments. The crosswalk surfaces are of Bomanite, a brick-colored textured material. The crosswalks are



The Village, Claremont, California

painted in addition to the special surfacing. The special surface was believed to send the signal that this is a pedestrian area and provide some effect on slowing vehicles, especially those entering the CBD area. Handicapped ramps are provided at all intersections.

In the residential areas, sidewalks are provided on essentially every street. The only exception is a new low density residential area in which sidewalks as well as curb and gutter were purposely omitted to, retain the previously existing rural character. Special pathways and equestrian trails are provided along the street frontage in some areas. Other walking takes place on the street. An observation of the area following its construction, however, shows that it does not necessarily provide the rural ambiance any more than other residential areas.

There are a number of nice residential areas close to the CBD and to the colleges. Surveys conducted as part of this project indicate a high percentage of residents walking to work (approximately 20 percent from the areas closer in). Although the pleasant walking environment, including the weather, certainly contributes to this, it is likely that the primary reason has to do with the land use characteristics and unique opportunity afforded by the university (stability in employment and general tendency toward less auto orientation). Sidewalks in many of the areas are significantly set back from the road and separated from the road by mature trees. This combination of conditions makes for a very pleasurable walking environment. The photographs on the following pages show the area.

IMPLEMENTATION AND FUNDING BACKGROUND

The redevelopment of the CBD was not preceded by a comprehensive design study. The redevelopment agency was already in place prior to this, and, in fact, was the primary initiator of the improvements. However, a basic set of objectives and design guidelines were established. Other than this, Claremont has not gone to any particularly unusual efforts to accommodate the pedestrian. The general plan contains some policy statements, but no detailed pedestrian-oriented plans. The city requires sidewalks for all new development, and this has been consistently applied over the years, with the only exception being the residential district. A consultant is currently conducting a design study to determine how to best maintain and improve Claremont's already attractive and walkable characteristics in the Village.

EVALUATION OF FACILITIES

Claremont has proved to be a highly desirable walking environment because planners were conscious of the need to provide pedestrian amenities over the years. The redevelopment of the Village has been particularly successful, evidenced by growing parking problems. The city is currently trying to decide whether to begin considering the erection of parking structures in the CBD or to substantially restrain further development. Although several small towns nearby have also attempted downtown improvement efforts, they have not been nearly as successful as those in Claremont. City planners have attributed much of this success to the unique advantage of having the colleges and associated student and faculty population in Claremont. It is a relatively stable economic base and supplies a significant captive pedestrian population. In addition, there is enough of an employment base in and around the CBD to foster economic activity. The location of the City Hall, library and Post Office downtown has assisted in the level of both economic and pedestrian activity. The landscaping and street modifications were well done, and have added to the pedestrian experience.

The residential areas provide a healthy combination of older and newer development. The older areas are particularly attractive and are convenient to the downtown and the universities. Although signs of wear and tear are evident in some locations, the facilities are generally well maintained.

The following is a summary evaluation based on the defined set of criteria.

- level of use by pedestrians - excellent; active downtown and in many of the residential areas.
- accessibility - excellent.
- continuity of path longitudinally - excellent; sidewalks are continuous through the entire city.
- continuity of path laterally (across the street) - good; particularly in the downtown area; some of the arterial streets in residential areas are quite wide and more difficult to cross.
- pedestrian delay - none.
- level of pedestrian hazard - low; some complaints were voiced by bicyclists about the slipperiness of the special crosswalk paving when wet. Also, women with high heels were found to dislike the textured crosswalk paving.

A typical local street.

Pedestrian treatment in the median downtown.

- degree of conflict with vehicles - low.
- clarity of directional information for pedestrians - good.
- directness of pedestrian path - good; but the interior parking lots sometimes require pedestrians to walk around to the front of the building to gain entry.
- aesthetics and environmental quality - excellent.
- security - excellent; there are no known problems with crime or vandalism.
- overall "friendliness" of pedestrian environment - excellent; Claremont provides one of the better walking environments one might find in a town of this size.

SUMMARY OF LESSONS LEARNED

It is clear that Claremont's sidewalk requirements have paid off over the years in the development of a continuous pedestrian system. The enhancements provided in the downtown compliment the generally attractive pedestrian environments city-wide. Claremont has some unique assets that made this possible, and it is clear that city planners and the redevelopment agency have used these assets wisely. A redevelopment agency that can provide resources and coordinate plans for public improvements is a significant benefit to the development of the pedestrian system. However, the success ultimately hinges on the economic development potential, and the success of the downtown can not be solely attributed to the pedestrian or streetscape improvements.

Well maintained sidewalk in a residential area.

FREMONT, CALIFORNIA

SITE TYPE AND LOCATION

Fremont, California is a city of approximately 150,000 persons located on the east side of San Francisco Bay midway between Oakland and San Jose. It is the location of a terminal station on the Bay Area Rapid Transit (BART) system, located approximately 30 miles from the San Francisco CBD.

Most of Fremont was planned as a new community, with development initiated in the late 1950s. It is an area of largely single-family homes, and except for the pedestrian system, is rather typical of suburban development in many places throughout the U.S.

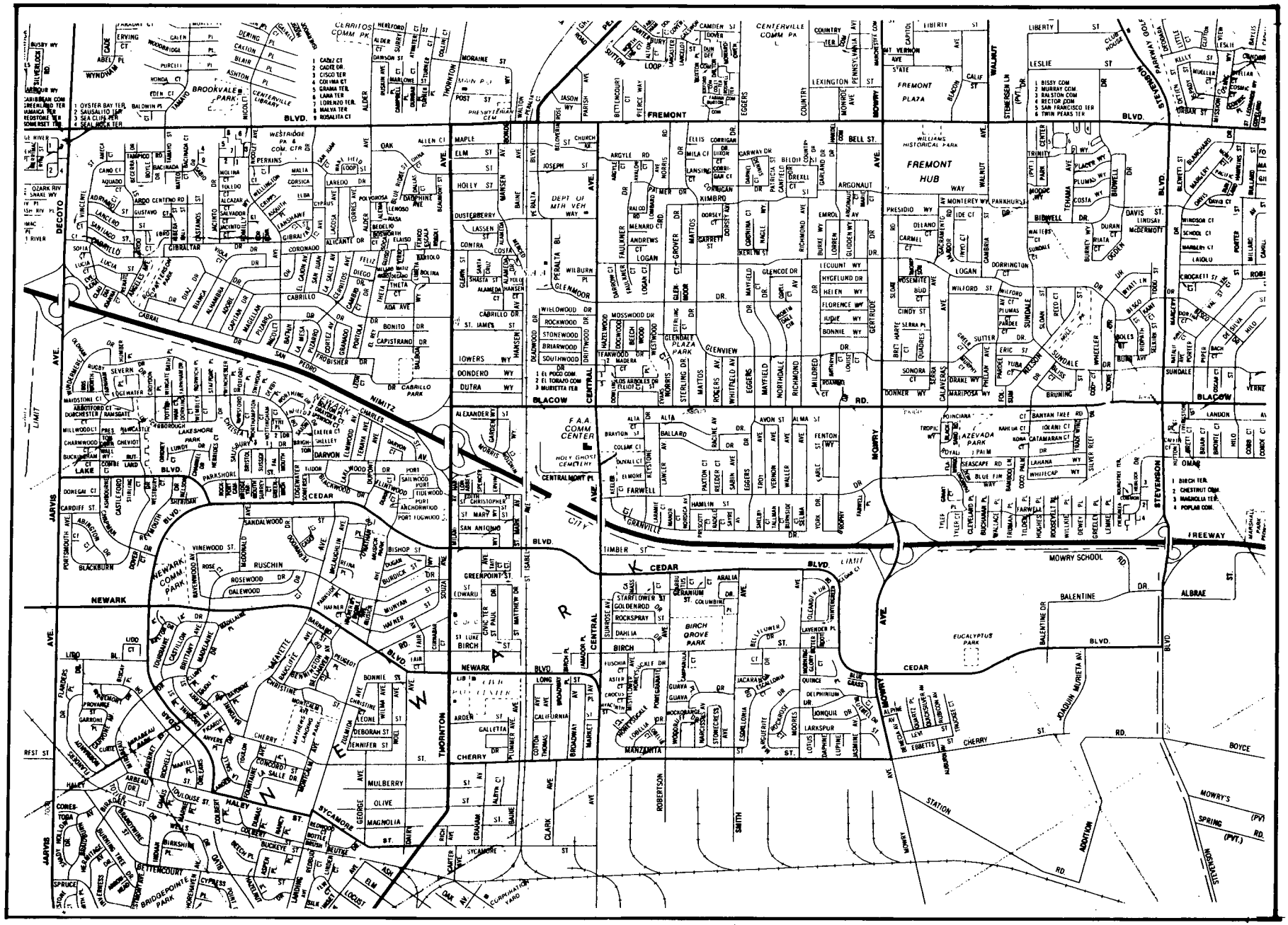
DESCRIPTION OF STREET SYSTEM AND PEDESTRIAN FACILITIES

The figure on the following page provides a map of Fremont, showing the extent of the street system. The master plan of Fremont, formulated over 20 years ago, called for an extensive greenway and pathway system throughout most of the city. Pathways were designed to go behind homes, and to connect neighborhoods with commercial establishments, schools and other public facilities. Green spaces approximately 20 to 40 feet wide were reserved for this purpose in many of the neighborhoods. In the early days of development, most of the pathways were constructed as planned. The photographs on the following pages depict the design of several pathway segments. Sidewalks were also provided in commercial, industrial, and residential areas.

In the late 1960s and early 1970s, because of limited use and negative response from adjacent residents, planners and developers began having doubts whether the pathway system was actually worth the investment. In addition, crime and security problems became significant factors and discouraged further development of the pathway system. Several specific aspects of these problems are discussed in the evaluation section.

Pathway cut through between blocks.

Major arterial street in Fremont. Street is well-landscaped.
Also note curb cut for pedestrians in channelized right turn lane.



Fremont Street System

Wide greenway in Fremont between rear yards. Atmosphere is quite pleasant, but fences hint at one of the problems - intrusion of privacy.

IMPLEMENTATION AND FUNDING BACKGROUND

The Fremont pedestrian pathway system exemplifies a well-intentioned plan that has fallen by the wayside because of a basic lack of support from both neighborhood and commercial interests. This lack of support stems from concern over two primary factors: the system's maintenance cost and continuing security problems. Security problems have apparently been the underlying factor behind the system's general lack of acceptance. City planners noted persistent problems with vandalism, peeping toms, drug dealing, rapes, and other crimes and nuisances. Although the problems were said to wax and wane over time, it was felt that the perception of security problems was the main reason for the plan's apparent demise. The police have also been negative about the overall concept for many years.

The plan originally called for pedestrian connections approaching the Central Business District, including pedestrian level lighting, special street furniture and other amenities, all financed by the local merchants. This plan was scrapped after partial implementation, and some of the existing pathways and amenities were even removed. In this case the paths were intended to serve utilitarian trips but were underutilized because they were not as direct as other routes. The merchants saw no benefits being realized from their investment. The pathway system had also become a general drain on the city's maintenance budget.

Because of the problem with the pathway system in the rear yards, the City has more recently focussed on enhancing the traditional sidewalk system. Typical features in the newer subdivisions include six to eight foot sidewalks with generous setbacks from the roadway. These have been found to be more secure and have been well accepted by the neighborhood associations.

EVALUATION OF FACILITIES

The discussion above, which generally reflects comments from city planning staff, presents the Fremont pedestrian system in a very negative light. On-site observation of the system revealed that the pathway system does provide for pleasurable recreational walking and jogging, and, in fact, there was visible walking and jogging activity on the trails. The system is still attractive and benefits at least a

proportion of the population. However, the overall public sentiment appears to be against it. The following is a summary evaluation of the Fremont pedestrian facilities based on the defined set of criteria.

- level of use by pedestrians - fair; mostly for recreational purposes. Used for utilitarian trips only where pedestrian magnets are closely located along the pathway.
- accessibility - excellent where the pathway is provided, but system is substantially incomplete.
- continuity of path longitudinally - fair; there are many missing links. However, pedestrians are not without a place to walk, since sidewalks are also provided in most areas.
- continuity of path laterally (across the street) - good; pedestrian accommodations across most arterial streets are adequate. Medians are provided and nicely landscaped, and curb cuts are provided for pedestrian crossings.
- pedestrian delay - none; no unusual delays.
- level of pedestrian hazard - low.
- clarity of directional information for pedestrians - fair; no special information provided.
- directness of pedestrian path - good; sidewalk provides the most direct route in most cases.
- aesthetics and environmental quality - excellent; Fremont has done a nice job both in its commercial corridors and some residential areas.
- security - fair to poor; this is one of the major reasons that the Fremont system has not been well accepted.
- overall "friendliness" of pedestrian environment - good; Fremont has given much more thought to pedestrian accommodations than most cities. Unfortunately, the security problems have resulted in a major public perception problem.

SUMMARY OF LESSONS LEARNED

In the early days of planning for Fremont, the city created an innovative walking environment. As a recreational amenity, the Fremont pathway system is an admirable addition to the Fremont parks and green spaces. One of the conclusions that appears to be rising from this experience and the other case studies is that visibility of the pathway is a major factor in at least the perceived concern over security. For this reason, it may have been better to take the green space dedicated to the pathway system behind the homes and to allocate it to the street frontages. This would have provided much greater design flexibility for the conventional sidewalk, and many of the same features could have been employed. It appears that Fremont is now taking this approach and finding a much higher level of acceptance from both developers and residents. Pathway systems in other communities should take the security problem seriously and design visibility and police car accessibility into the network. Enhanced front yard sidewalk systems may prove to be a better alternative in the long run.

Other treatments of pedestrians along the commercial corridors appear to have worked well. The value of medians on major highway facilities and arterial streets in suburban areas such as Fremont cannot be emphasized enough. Fremont has done a particularly nice job in landscaping the major arterials, making the entire area a more pleasant walking environment.

SUN CITY, ARIZONA

SITE TYPE AND BACKGROUND

Located 15 miles northwest of Phoenix, Arizona, Sun City is a preplanned community of 55,000 located on 9,000 acres of land. Initiated in 1960, Sun City was one of the first adult/retirement developments in the southwest. Complete with several golf courses, recreational and social centers, Sun City presents the best side of a leisurely retirement.

Although there are different levels of housing density, the predominant type is single family detached homes. Besides the amenities in the area, there are small pockets of commercial activity interspersed throughout the community.

DESCRIPTION OF THE PEDESTRIAN FACILITIES

Sidewalks are provided for all residential frontages, but there are no sidewalks along the major north-south and east-west arterial streets (99th Avenue and Grand Avenue) in Sun City. The absence of sidewalks on these streets tends to segment the individual neighborhoods from a pedestrian standpoint. However, a golf course and recreation/social center are located in each neighborhood, so for the most part the major community focal points are accessible on foot. The major east-west arterial is Grand Street (U.S. 93), and the major north-south arterial is 99th Avenue. There are sidewalks along the major collector streets, e.g., Del Webb Boulevard, 107th Avenue (see figure).

One of the most interesting elements of Sun City is the predominence of golf carts as a major mode of travel. Carts can be seen driving on the major arterials and parked in the parking lots of shopping centers. Golf cart transportation is so easy and generally accepted that it is used even for some of the short trips that would otherwise be made by walking. There is a visible lack of pedestrian activity in both the commercial and residential areas.

IMPLEMENTATION AND FUNDING BACKGROUND

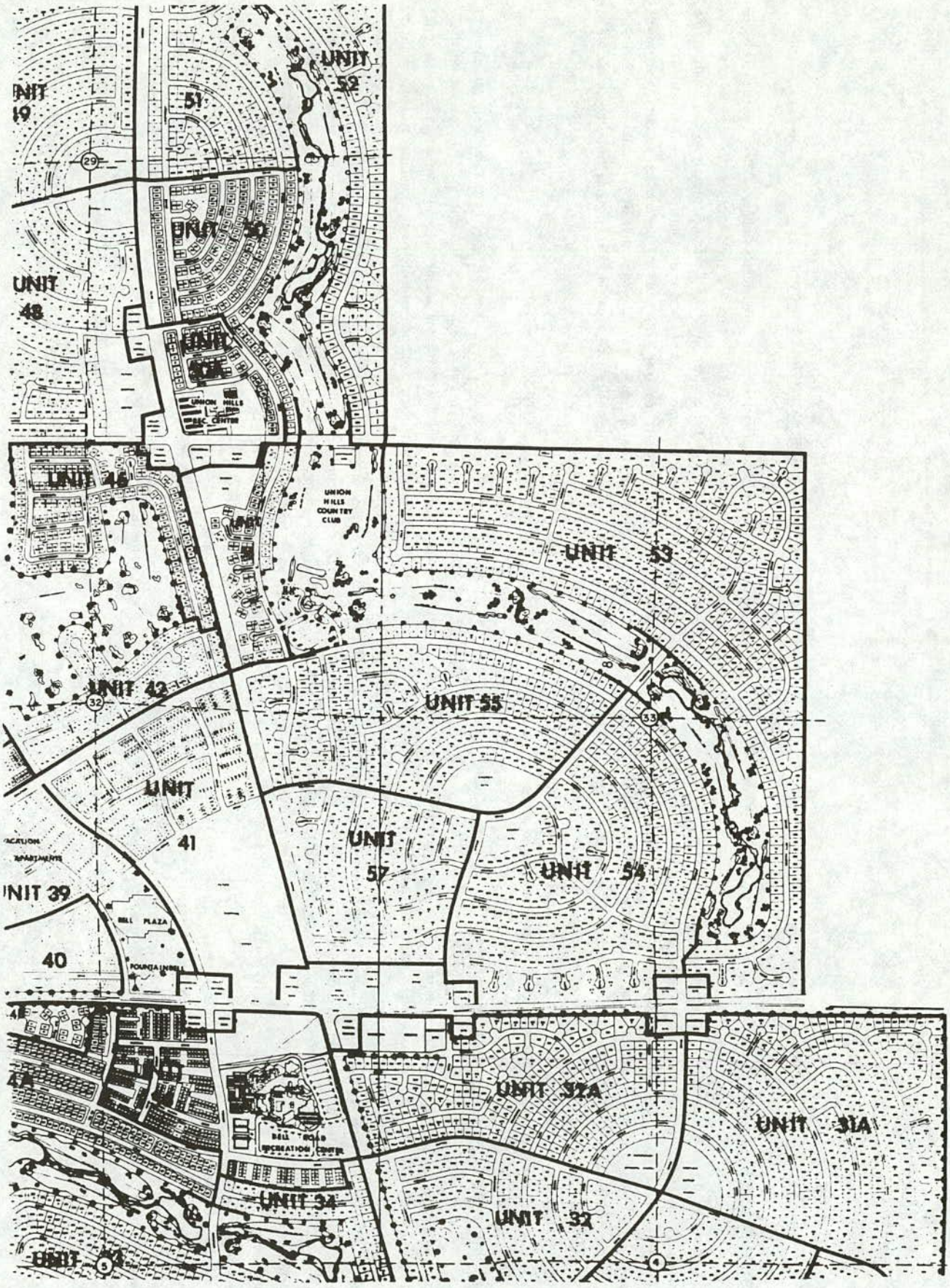
Sun City is an unincorporated area in Maricopa County. When built, there were no specific requirements by the County regarding the inclusion of sidewalks in the site plan. The development of the pedestrian network was completely in the hands of the developer. Since the development was planned as an adult/retirement community with leisure time activities as a central selling point, pedestrian activity was to be expected. Therefore the developer saw the inclusion of sidewalks as a desirable element. The funding for the entire Sun City development came from the developer as well.

EVALUATION OF THE FACILITIES

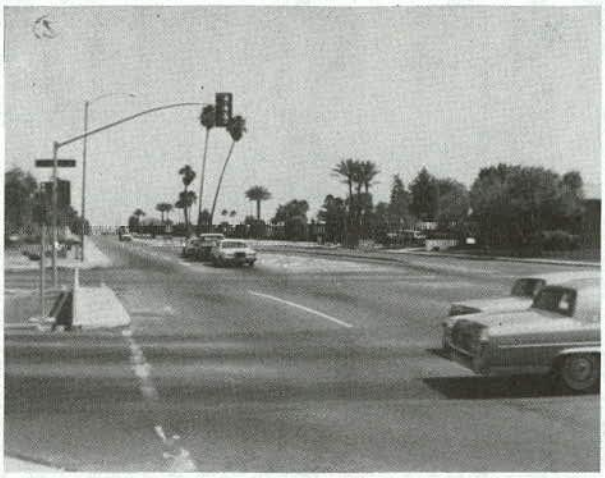
What little walking seems to be done in Sun City is of a leisurely recreational nature. Therefore the existing network seems to be more than adequate to meet these needs. While the lack of sidewalks along major arterials does segment the total development, it is doubtful that the adult residents of the community would want to travel by foot from one end of this 9,000 acre development to the other. The bulk of the activities they might engage in are accessible to pedestrians and the existing network meets their immediate needs. However, some of the blocks are quite long and pedestrian access to certain focal points of activity are indirect. Pathway easements through some of the neighborhoods might have made these facilities more accessible. This problem varies with the type of street layout.

The following is a summary evaluation of the Sun City pedestrian facilities based on the defined set of criteria:

- level of use by pedestrians - good; high level of use for recreational trips.
- accessibility - fair; long blocks make for indirect pedestrian connections in some areas.
- continuity of path longitudinally - good; good continuity within neighborhoods.
- continuity of path laterally (across the roadway) - good; except for crossings of major arterial streets where walking is discouraged.
- pedestrian delay - none.



Sun City General Plan



Typical cross section on major arterial street in Sun City

Typical residential street.

Golf carts mixed in with auto traffic. Few pedestrians were noted in any of the photographs.

Most signalized intersections have pedestrian actuation Note arrows indicating direction corresponding to each button. This is often neglected in some cities.

Golf carts replace walking as primary mode to many local services

- level of pedestrian hazard - low; curvilinear streets assist in speed control.
- degree of conflict with vehicles - low; in the neighborhoods.
- clarity of directional information - good; neighborhood pathways are well defined.
- directness of pedestrian path - fair; paths follow the street alignment, and more provisions might have been made for pedestrian movement through the middle of blocks.
- aesthetics and environmental quality - excellent; well kept homes and streets make for a very pleasant walking environment.
- security - good; some street lighting; no real problems apparent.
- overall "friendliness" of pedestrian environment - good; an enjoyable place to walk.

SUMMARY OF LESSONS LEARNED

Even though there were no local regulations requiring the developer to provide sidewalks in the development, it was given that the Sun City community would be more attractive to retiring adults if walking was available as one of their leisure time activities. In the final analysis, it appears that the popularity of the carts has probably supplanted some of the possibilities for pedestrian travel. Sun City provides evidence that a complete sidewalk system is usually adequate to accommodate most walking needs. If sidewalks are the only accommodation, however, street blocks should be kept short and/or special pedestrian connections should be provided through the middle of blocks. Providing the pedestrian connections in lieu of a more complex street network may actually minimize transportation infrastructure costs. This becomes particularly important near primary pedestrian destination points so that a short "as-the-crow-flies" distance is not made into an unnecessarily long pedestrian trip. Curvilinear streets are also a help to the pedestrian, controlling vehicular speeds. The existence of unique forms of transportation, such as the carts found in Sun City, should not justify the elimination of sidewalks, since some amount of walking will always occur.

SITE LOCATION AND BACKGROUND

Located approximately 20 miles west of Philadelphia, Chesterbrook is an 865 acre mixed use planned community. The site is made up of clusters of development separated by large parcels of open space. Part of the project is the 130 acre Chesterbrook Corporate Center, a campus style office park that houses the corporate headquarters of many nationally known firms. Included within the site is a 115,000 square foot neighborhood shopping center. However, the bulk of the development is the residential villages. These villages are clusters of similar types of housing, either detached or attached single family homes.

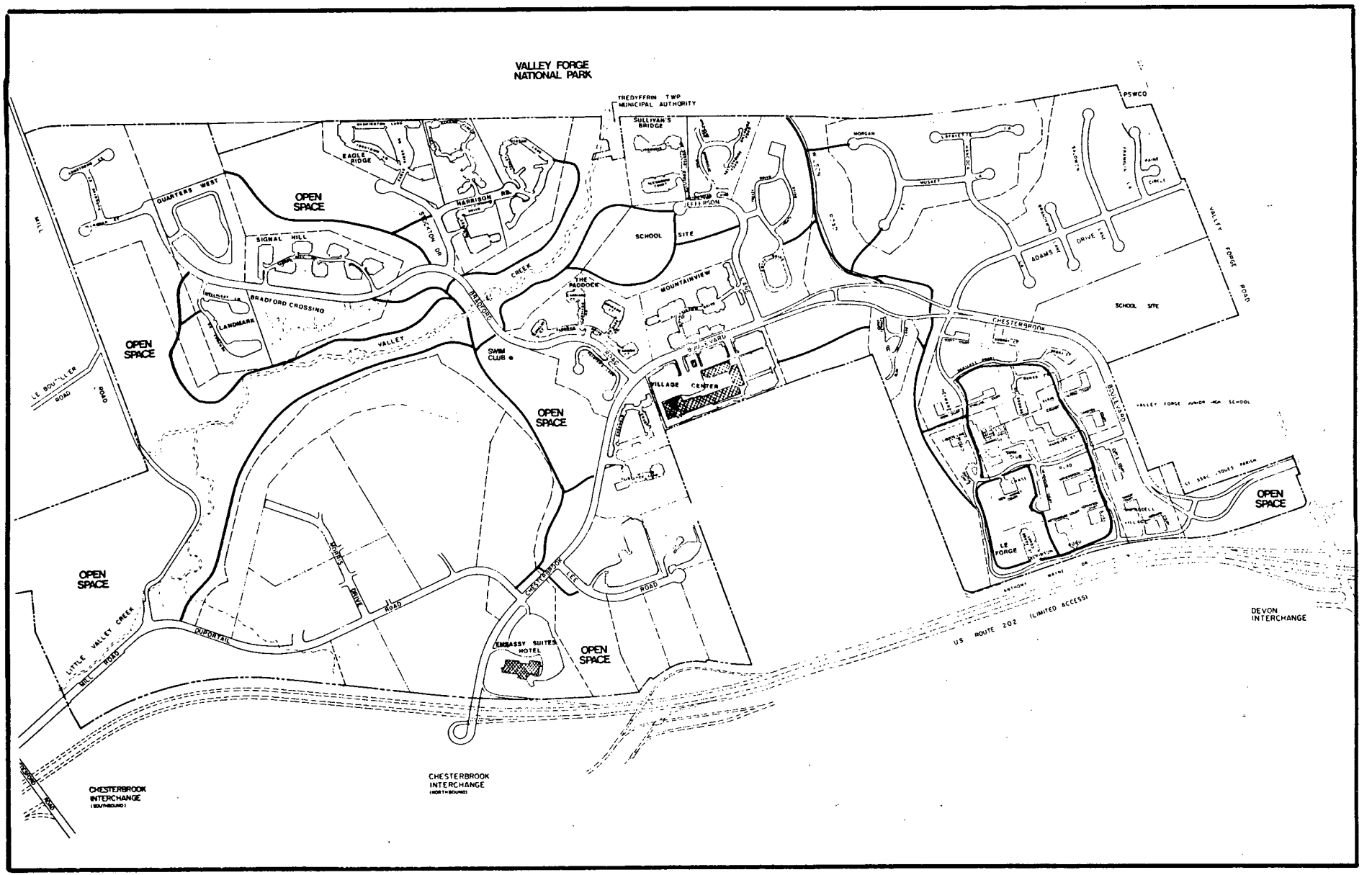
DESCRIPTION OF THE PEDESTRIAN FACILITIES

Each of the development clusters, including the office park and retail center, are interconnected by a walkway/bikeway system (see figure). The system is made up of asphalt paving of varying widths that follows the natural contours of the area. Passing over streams and through meadows, it is a pleasant walking environment. In many parts of the system, the paths are lighted, but most of the lighting comes from housing clusters which have street lighting for the automobile traffic. At certain points the path system does cross some streets. These crossing points were chosen to be areas where there were good sight lines, however, no special signing or pavement markings have been provided in these areas. The path system is planned to be tied into neighborhood schools when they are built.

The photographs on the following pages show some features of the Chesterbrook pedestrian/bikeway system.

IMPLEMENTATION AND FUNDING BACKGROUND

In 1970 Tredyffrin Township prepared a revised master plan prompted by a 63 percent increase in the township population over a ten year period. Part of the new plan created a Unified Development Area (UDA) zone of 1,000 acres. This was done to allow this large parcel of land to develop in an orderly and coordinated fashion rather



Walkway/Bikeway System, Chesterbrook, Pennsylvania

View of the pathway near high density housing location.

Pathway across from housing units. Note how street lighting is also used to illuminate the pathway.

Pathway crossing a local stream. Note corporate center building up on the hill.

Along major access roads no pedestrian areas are provided.

than as a series of small subdivisions. During the early 1970s, a developer acquired the bulk of the property in the UDA zone, and presented a general plan for the development of the entire area. The plan was accepted and development of the individual clusters began in the late 1970s. Even though a general plan was approved for the whole area, the township planning commission still retains site plan review powers for each project built.

There are no specific requirements for pedestrian facilities within the township code pertaining to the UDA zone. However, the developer, his planning consultant and landscape architect included the pathway system as part of the total project plan.

Along with the pathway system, much of the current open space was planned to be used for a golf course, but the residents are so pleased with the common open space as is, the development of the golf course has been dropped from the plan.

Funding for the Chesterbrook community came completely from the private sector. This even included funding of the construction of a 1.7 million dollar interchange to U.S. Route 202.

EVALUATION OF FACILITIES

The pedestrian/bicycle pathway system in the Chesterbrook community is extensive; but it actually functions as a specialized facility. The principal user group are the children who live in the different residential villages. The most frequently made trips are school trips and inter-cluster trips to visit friends. The children travel by foot and bicycle.

In Chesterbrook, 97 percent of the adults surveyed indicated that they walk for exercise or recreation, but over half of these do so less than once per week when weather is favorable. Approximately one-quarter reported that they run or jog. Only three percent reported that they walked to work. Some three-fourths of the residents surveyed indicated that they walk to shopping areas, with the majority of these stating they do so one to four days per week. The surveys were conducted in housing clusters most convenient to the shopping area. Clusters farther away would be unlikely to have many walking trips to the center. Respondents to the survey especially liked the open space and trails. However, many residents noted the lack of sidewalks along the major roads in the area.

The distances between the clusters seem to foster this type of trip making pattern. The distances are long enough to make most adults hop in a car rather than walk, but not so long as to discourage the children, who really have no alternative other than being driven by an adult, from biking or walking.

The following is a summary of the Chesterbrook pedestrian facilities based on the defined set of criteria:

- level of use by pedestrians - good; majority of the use is by children or recreational walkers.
- accessibility - good; grades follow natural terrain which might be a little too steep for older pedestrians.
- continuity of path longitudinally - excellent; no breaks in the system
- continuity of path laterally (across the roadway) - good; road crossings are in areas with good sight lines.
- pedestrian delay - none.
- level of pedestrian hazard - none; the majority of the pathway is away from vehicle traffic.
- degree of conflict with vehicles - none; separated from traffic with little chance of conflict; at crossing areas the volumes are relatively low.
- clarity of directional information for pedestrians - fair; network is fairly complex without maps or signing along the way.
- directness of pedestrian path - fair; since the system follows the natural contours of the terrain, it does not always follow what appears to be the shortest route.
- clarity of information provided for drivers - fair; although the pedestrian crossing areas have clear sight lines, the low pedestrian volumes may cause some drivers to be less than prepared for pedestrians. Signing may help this.
- aesthetics and environmental quality - excellent; very relaxing, pastoral setting.
- security - good; some stretches are "out in the middle of nowhere," but there appear to be no crime or vandalism problems and residents did not express this as a concern.
- overall "friendliness" of pedestrian environment - excellent; a very pleasant walking environment.

SUMMARY OF LESSONS LEARNED

In the design of site plans today, automobile accessibility is a must. Residents of high density areas want to be able to walk out their door, get in their car and go. Businesses want to have ample parking for their employees (and lower rents), so they leave their central city locations for newly developed office parks. New projects would not be viable without these features. This creates problems for the planner in that it is difficult to meet the auto accessibility needs and also make allowances for the pedestrian.

The Chesterbrook community seems to be a reasonable compromise of these divergent needs. The use of the system may be not as great as some might like to see, but considering that it is primarily an automobile oriented community, the pedestrian facilities are provided and provided well. Chesterbrook is novel in that the residents at least have a choice, while in many other places they do not. One observation emerging from Chesterbrook, as well as other planned communities, is that a pathway system does not eliminate the need for sidewalks along major streets (especially arterial and collectors). Residents in Chesterbrook clearly noticed their absence of sidewalks.

SITE LOCATION AND BACKGROUND

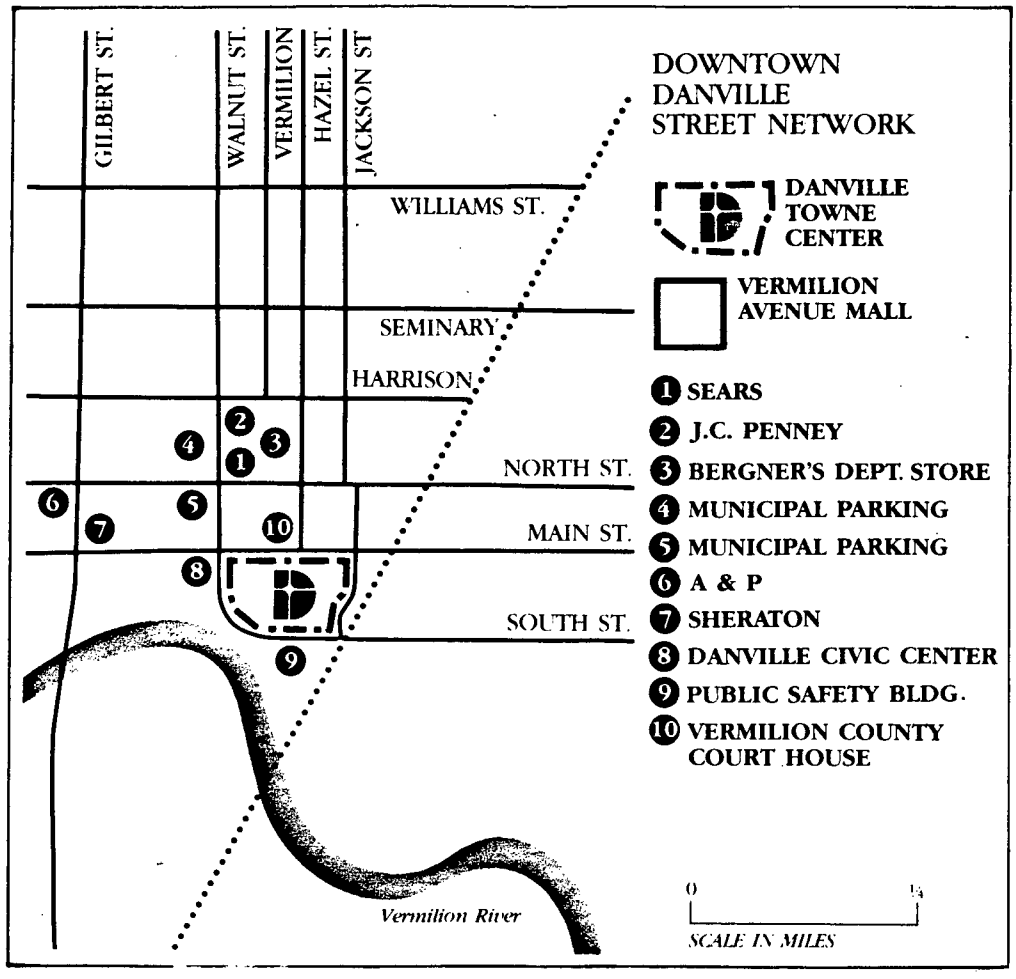
The City of Danville is in eastern Illinois. Centrally located to Chicago, Indianapolis, and St. Louis, Danville is the county seat for rural Vermilion County. It is an older town with 40 to 50 percent of its development occurring before 1940. Today it serves as the retail and commercial center for an urbanized area with a population of 52,000.

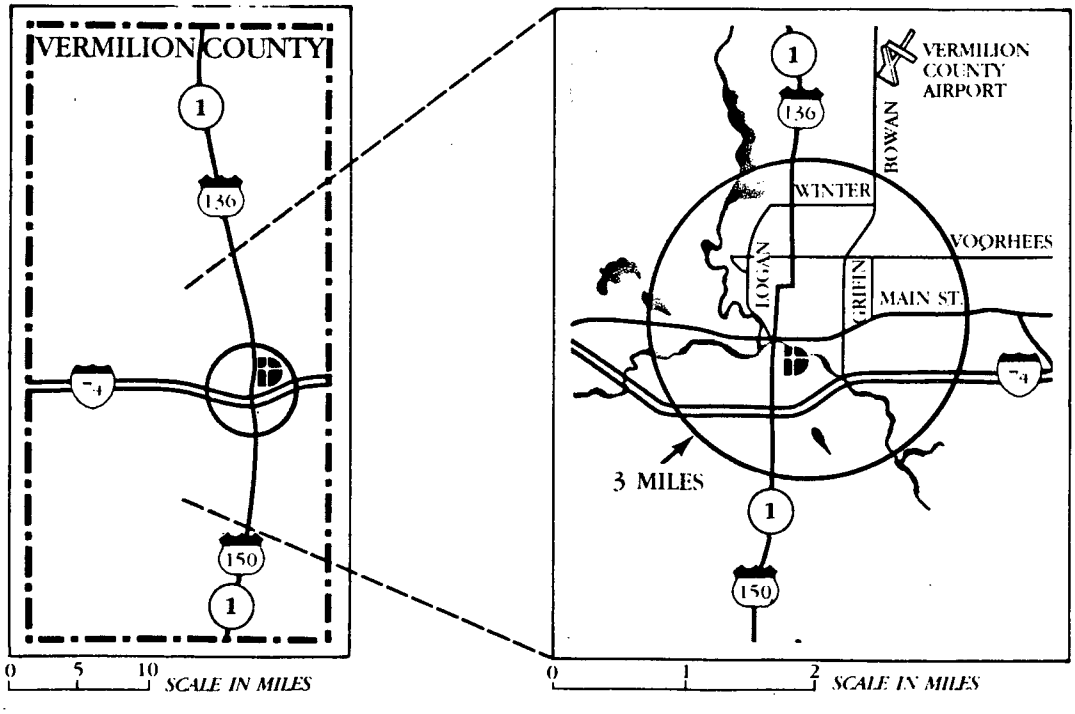
During the 1960s, Danville found itself faced with a problem many other cities were experiencing, the movement of retailers away from the CBD to other nearby developing areas. Local planners attempted to stop the flow of businesses out of the CBD by creating a pedestrian mall in the downtown area in the late 1960s. The Vermilion Park Mall has never seemed to satisfy everyone. There have been attempts to change it or to reopen it to automobile traffic, but it has survived through today.

In the early 1980s, Danville again found itself losing its grip on some of its downtown retailers. An unsteady economy nationally, and the attraction of a new enclosed mall near the newly developing north end of the town, pulled many businesses out of the CBD. In an attempt to halt their second wave of merchants from leaving the downtown, a new office/retail center was built at the end of the Vermilion Park Mall in 1982. This development is the Towne Center complex.

DESCRIPTION OF THE PEDESTRIAN FACILITIES

Together the Vermilion Park Mall and Towne Center form the core of the Danville CBD (see figure). The Vermilion Park Mall is the closed section of Vermilion Avenue running from Main Street north to Harrison Street for a length of two blocks. There is a break in the Mall as it crosses North Street. North Street between Walnut and Hazel Streets serves as a bus transfer center for the Danville Runaround. There is a fixed-time traffic signal with pedestrian indications, provided at the North Street crossing. Along the length of the Mall there are planted areas, street furniture and bicycle racks. Relying on the street lighting left over from when it was a through street, the Vermilion Park Mall is very well lit. At the southern end of Vermilion Park Mall, Main Street separates the Mall and the Towne Center complex. Main Street





Danville Business District

(U.S. Route 136) is a four-lane arterial with center turning lanes. The curb-to-curb width at Vermilion Avenue is approximately 54 feet. A pedestrian actuated signal allows for the crossing of Main Street.

Across Main Street from the Vermilion Park Mall is the Towne Center complex. The major features of the complex are a discount supermarket, a large drugstore (total retail space in the complex is 100,000 square feet), and a 85,000 square foot office structure. The buildings of the complex are set back from Main Street with a 530 space parking lot separating them from the end of the Vermilion Park Mall (see figure).

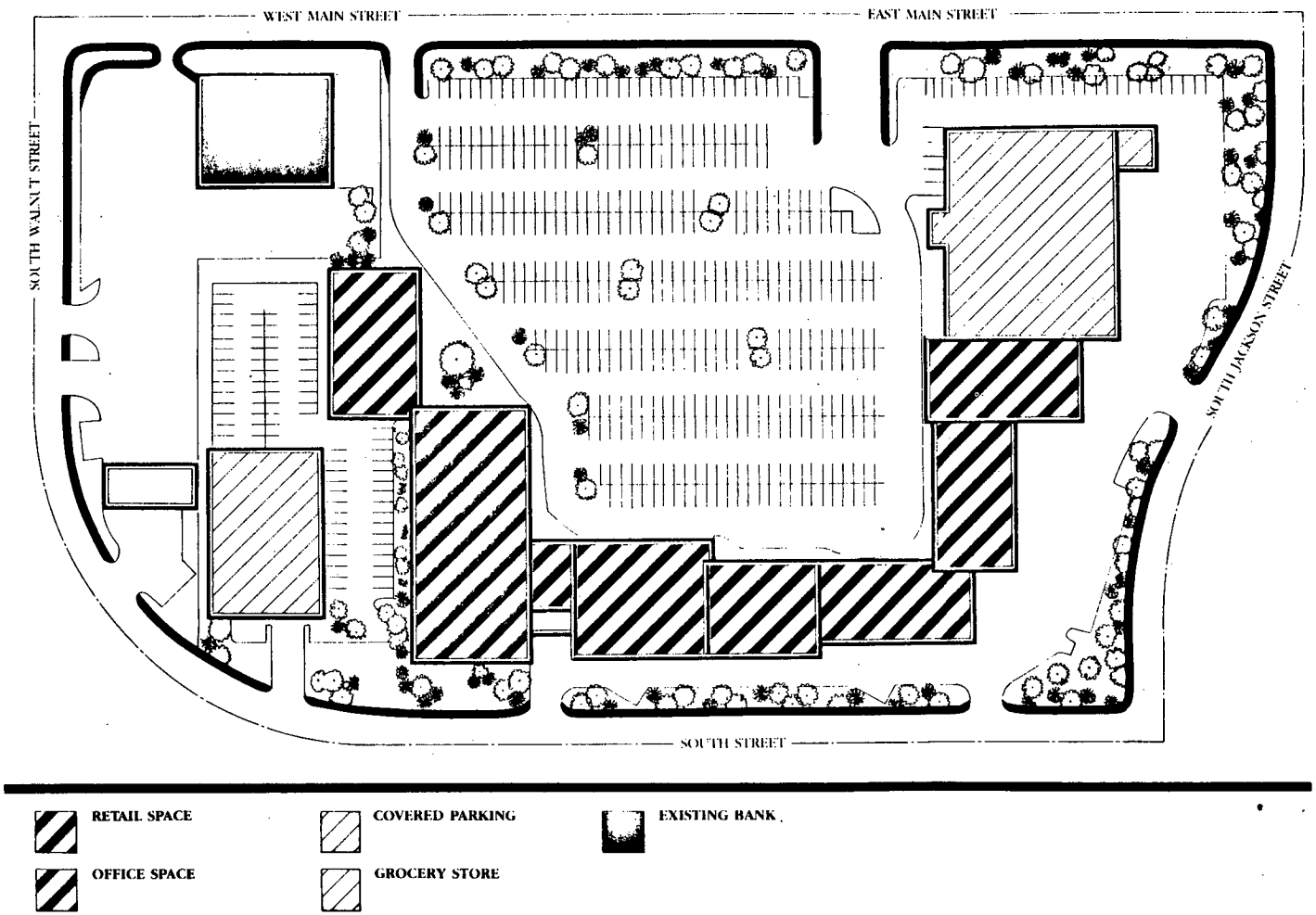
IMPLEMENTATION AND FUNDING BACKGROUND

When the Vermilion Mall was built in 1969 it was totally financed by Danville through a revenue sharing scheme. The Towne Center complex was built by a private developer on an Urban Renewal tract with assistance from an Urban Development Action Grant (UDAG).

The principal driving force behind the Towne Center development was the state of the economy in the late 1970s and early 1980s. The employment base of the urbanized area comes from industrial manufacturing with General Motors, Hyster and Wyman Gordon representing three of the bigger employers in the area. The recessed economy of that period had increased unemployment greatly in the area. The potential economic benefits of the Towne Center development were more of an attraction than creation of a pleasant pedestrian environment. The Towne Center project was built for approximately 15 million dollars. It created 300 construction jobs, and 100 permanent jobs. It also added some stability to a shaken downtown retail community.

EVALUATION OF FACILITIES

The Vermilion Park Mall has an excellent diversity of retail facilities in both size and type. The discount supermarket in Towne Center is very well patronized, and overall the complex seems to be doing well. The level of pedestrian activity in the area, however, is relatively low. The greatest problem seems to be getting people out of their cars.



Site Plan for Town Center

The majority of the people patronizing a business in both the Vermilion Park Mall and Towne Center use their automobiles to go from one place to the other. A person visiting Vermilion Park Mall will drive to one of the public parking areas along Walnut or Hazel Street, walk to the Mall, conduct their business, return to their car, drive to the Towne Center parking area and conduct their business there. Walking distance seems to be the major factor. The overall walking distance across the entire corridor, from Harrison Street to the setback store fronts at the Towne Center site is 1,700 to 1,800 feet, about an eight minute walk. Even though a signal is provided at Main Street, the crossing is perceived to be a major access barrier for many people.

More potential for walking may have been realized by reducing the distance between the magnets. Perhaps if the Towne Center development fronted closer to Main Street, using minimal setbacks, and the Main Street crossing was made more friendly, the problem might have been mitigated somewhat. This would also have the added advantage of moving the parking area to the rear of the site. This would allow the parking area to be accessed from South Street which has lower vehicle volumes than Main Street. However, security in the parking lot would then have been more of a concern, and it is doubtful whether the rearrangement of the facilities would have been beneficial overall.

Another problem the area is facing is one of image. The apparent public perception of the area is that there is not enough parking "downtown"; and that it is less secure than other areas. Attempts have been made to change these ideas by downtown business organizations through promotional activities, but the effects seem short lived.

The following is a summary of the Danville pedestrian facilities based on the defined set of criteria:

- level of use by pedestrians - fair; relative to the business activity the area sees, the pedestrian activity is low.
- accessibility - excellent; being an older urbanized area places outside the CBD are well connected to the downtown; most curbs are ramped in the CBD area.
- continuity of path longitudinally - fair; continuity is provided throughout the corridor, however it is a very circuitous trip across Main Street to enter Town Center unless one cuts directly through the parking lot.
- continuity of path laterally (across the roadway) - fair; the width of Main Street and current level of traffic gives a strong sense of discontinuity.
- pedestrian delay - moderate; Main Street is wide, and the pedestrian actuated signals do not provide adequate time for crossing movements.
- level of pedestrian hazard - low; area is well lit with clear sight lines.
- degree of conflict with vehicles - severe; combination of volumes and width of Main Street produces discomfort.
- clarity of directional information for pedestrians - good; the corridor layout of the Mall leaves little room for confusion.
- directness of pedestrian path - good; gridiron pattern of streets channelizes the pedestrian movement.
- clarity of information provided for drivers - fair; nothing special to alert traffic on Main Street or North Street that pedestrians may be in the area.
- aesthetics and environmental quality - good; pleasant walking environment.
- security - good; well lit and police patrolled; public perception is biggest problem here.
- overall "friendliness" of pedestrian environment - fair; the barrier created by Main Street is the biggest impediment.

SUMMARY OF LESSONS LEARNED

It is apparent that just providing a pleasant pedestrian facility does not mean people are going to use it. There are other forces at work as well. The realities of the free market in development and public perception have made the Vermilion Mall/Towne Centre area less successful than the planners originally intended. The area has maintained the economic viability of the downtown, but high levels of pedestrian activity which might make the commercial success greater, has not been seen. This might be summarized by altering an old adage, "You can lead a pedestrian to the mall, but you can't make him walk."

OXFORD VALLEY MALL, LANGHORNE, PENNSYLVANIA

SITE LOCATION AND BACKGROUND

Oxford Valley Mall is located in Langhorne, Pennsylvania, a suburb of Philadelphia northeast of the central city. It is a typical regional mall with over 500,000 square feet of floor space and several major department store anchors. The mall is of interest because of its provision of a special pedestrian walkway system, bringing pedestrians through the parking lot from the site periphery.

DESCRIPTION OF PEDESTRIAN FACILITIES

The photographs on the following pages indicate the nature of the pedestrian facilities. A problem typical of major shopping malls is the insecure feeling of walking across a large, open parking lot. At most malls there is little refuge that can be found, and vehicles can often be seen speeding diagonally across the open lot. This problem is less serious when the parking lot is filled with cars, but the lot is near capacity only during the peak seasons of year.

Oxford Valley Mall solved this problem by constructing a path of islands diagonally across the parking lot in two different directions, facilitating pedestrian access from the site periphery. Two sets of islands are provided, and both radiate diagonally out to remote corners of the site. The islands are like stepping stones, providing refuge for those walking to and from the mall. Perhaps the most important feature of the islands is their effect on slowing and channelizing traffic, this too benefitting the pedestrian.

The walkway system was intiated by the developer and was built shortly after the construction of the Mall itself, approximately 15 years ago. The islands were not elaborately constructed, but simply used railroad ties nailed to the pavement. The islands were filled in with dirt and trees planted on the four corners of each island. Thus, the landscaping is simple and maintenance costs are kept low. The islands were actually constructed after the parking lot was paved and striped, and is, in a sense, a retrofitted treatment. Similar treatments could be employed in almost any shopping center or other major parking facility. The area surrounding the mall is primarily single family housing.

Patnway looking out toward periphery of mall.

View as a pedestrian approaching the mall.

EVALUATION OF FACILITIES

Observation of the facilities suggests that the islands do, in fact, accomplish their intended purpose. The only unfortunate thing is that there are relatively few pedestrians drawn in from the periphery to take advantage of it. Usually, only one or two percent of patrons walk to a typical mall, and observation of Oxford Valley Mall indicates it to be no exception. Functionally, however, the islands are quite effective at vehicular speed control, and provide a much more comfortable, secure walking space for those who wish to walk.

One of the islands was observed to be missing, but the reason for this omission is not known. Along one of the paths, steel posts have been erected at the pedestrian entry to each island to prevent intrusion of motorized traffic. The following is a summary evaluation of the Oxford Valley Mall pedestrian facilities:

- level of use by pedestrians - fair; pedestrians would certainly use it, but major pedestrian generators do not exist near the mall
- accessibility - good; the islands provide a much safer, more comfortable access route than normally found in a mall
- continuity of path longitudinally - good; the one missing island is adjacent to the mall, and pedestrians must walk around the cars usually parked there
- pedestrian delay - none
- level of pedestrian hazard - none; much improved over an open parking lot
- clarity of directional information for pedestrians - good; although no signs are provided, the pathway is well delineated by the trees, and it is very clear where it is intended for pedestrians to walk
- directness of pedestrian path - good; although the walkways cannot satisfy all possible walk trips, the fact that they radiate to the corners of the site maximizes their potential for use. In general, walkways are more necessary from the corners of sites than from midblock locations, and the design used here reflected that.
- aesthetics and environmental quality - good; simple landscaping is enough to make the islands attractive. They blend into the surroundings quite well.
- security - good; no security problems were noted, except possibly the use of motorized vehicles on the paths at one time, which prompted the erection of the steel posts
- overall "friendliness" of pedestrian environment - excellent, especially compared with most other malls

SUMMARY OF LESSONS LEARNED

The pathway system used in Oxford Valley Mall is worth investigating for its applicability to other similar situations. However, one of the major objections is likely to be the loss of parking capacity. Each island can replace what would have been up to eight parking spaces. As parking requirements are a major determinant of development capacity, the number of spaces would probably become a major issue to most developers. The islands could be constructed somewhat smaller than was done here, taking away as few as four spaces. Control of vehicular speed should be planned for in all large parking lots, and this will usually entail some type of channelization with landscaping. Having no channelization at all, as is still done in some parking lots, is poor design practice from the perspective of the pedestrian as well as of the vehicle. Guidelines for parking lot landscaping can be included in local zoning ordinances, as a means to implement this principle.

PLYMOUTH MEETING MALL, PLYMOUTH TOWNSHIP, PENNSYLVANIA

SITE TYPE AND LOCATION

Plymouth Township is a suburb of Philadelphia, located approximately 15 miles northwest of the city center. Plymouth Meeting Mall (PMM) is located in the township. The mall is a regional size retail facility with several major stores serving as anchor points, and many smaller retailers and speciality shops. The PMM was built in 1969.

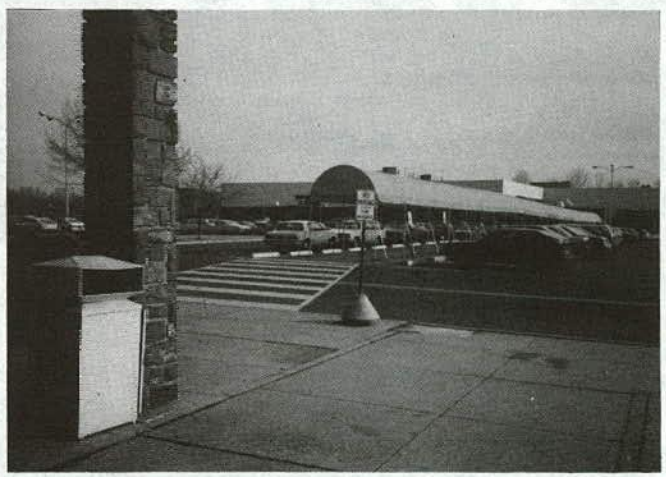
At the site, the mall management company wanted to accommodate another major retail facility. Since the major retail facilities were fully occupied, a new detached structure was built to house the new tenant. The new building was placed on-site across a parking area from the main complex. The new facility was completed in June 1985.

DESCRIPTION OF PEDESTRIAN FACILITIES

In October 1985, the Mall Management Company built a covered walkway to facilitate and encourage pedestrian movement between the two facilities. The walkway is a section of the lot formerly used for vehicle parking. The parking layout in this area was reconfigured to create a pedestrian aisle that is the most direct path between entrances of the two structures (see photographs). The walkway is delineated by a combination of pavement markings and concrete wheel stops. The covering for the walkway is a canopy made of galvanized steel tubing and waterproof canvas. At either end of the canopy there is a short open crossing area. These crosswalks are marked and signed.

IMPLEMENTATION AND FUNDING BACKGROUND

As stated earlier, the driving force behind the construction of the walkway was a desire by the mall managers to encourage pedestrian traffic between the two buildings. The entire construction cost of $21,000 was borne by the mall management.



Two views of the pedestrian canopy at the Plymouth Meeting Mall.

EVALUATION OF FACILITY

The walkway is a resounding success. Not only is it used for trips between buildings, but many pedestrians heading from their cars to one of the buildings use the walkway as well. The level of use of the walkway does not seem to be weather dependent.

The following is a summary evaluation of the Plymouth Meeting Mall covered walkway using the defined set of criteria:

- level of use by pedestrians - good; used often regardless of weather.
- accessibility - good; flat grade throughout walkway, hampered by lack of curb ramps at either end.
- continuity of path longitudinally - excellent.
- continuity of path laterally (across the roadway) - good; narrow crossing widths and relatively slow vehicle movement.
- pedestrian delay - none; no capacity or flow problems.
- level of pedestrian hazard - none; accident potential is low.
- degree of conflict with vehicles - none; crossing area volumes are low enough to permit plenty of gaps to allow pedestrian crossings.
- clarity of directional information for pedestrians - excellent; walkway path is clearly marked for the pedestrian.
- directness of pedestrian path - excellent; single feature that contributes most to the success of this facility, the walkway is the shortest path between the two buildings.
- clarity of information provided for drivers - excellent; the combination of the canopy, pavement markings, and signing should leave little doubt for motorists that they are approaching a pedestrian area.
- aesthetics and environmental quality - good; visually pleasing; the canopy is a bright, festive yellow color.
- security - good; although the canopy is not internally lit, the open structure design and good parking lot lighting makes for a secure feeling.
- overall "friendliness" of pedestrian environment - good; it is nice to have a friend like this on a rainy day.

SUMMARY OF LESSONS LEARNED

The Plymouth Meeting Mall covered walkway is an example of how if the desires of the pedestrian are met, the facility will be a success. Today, since most people do not want to go out of their way to walk, their most basic desire is to be a pedestrian for the shortest amount of time that they have to. This translates into giving them the shortest route possible to their destination. The principal reason for the high use of this facility has to be its "shortest distance between two points" feature. Had it not been the shortest route possible, it would not be too unreasonable to guess that it would sit, unused, as a monument to poor planning. As it is, though, it is a tribute to good common sense design. This facility serves as an example for outparcel development that is occurring at many new and existing malls around the country. The major constraint to making this type of pedestrian improvement more often is the alignment of the parking aisles. The concept works best when aisles radiate from, rather than parallel the mall.

MAITLAND CENTER, ORLANDO, FLORIDA

SITE TYPE AND LOCATION

Maitland Center is large office park in the City of Maitland, located north of the city of Orlando, Florida. Located immediately west of Interstate 4, Maitland Center consists of nearly two million square feet of office space and is approximately 95 percent built out at this time. The Sun Bay Club is a small residential complex consisting of 54 dwelling units located at the north end of the project. The project was originally conceived in the early 1970s as a mixed use office/commercial development on a burned-out orange grove. Sites were to be sold to individual developers, but by 1973 only one building permit had been pulled, and the lending institution foreclosed on the mortgage and took over the property. The services of a land planning and engineering firm were contracted to develop an improved marketing and design scheme.

DESCRIPTION OF STREET SYSTEM AND PEDESTRIAN FACILITIES

The figure on the following page presents the site plan for Maitland Center. As noted, it has access off a freeway interchange, with one major entrance to the office park complex. The traffic circulation pattern consists primarily of divided streets, winding throughout the office park. The most distinctive characteristic of Maitland Center is the walkway system and landscaping. As shown in the photographs that follow, walkways meander along the property frontages, sometimes a substantial distance from the street itself. Earth berms are located between the walkways and the buildings and parking lots to provide some visual separation. Special signs and entrance treatments are also provided, giving the complex a unique identity. The initial right-of-way landscaping, walkway, and site entrance features were provided by the owner, but responsibility for landscaping a 35 foot wide landscape and utility easement along the street frontages is that of each individual site developer.

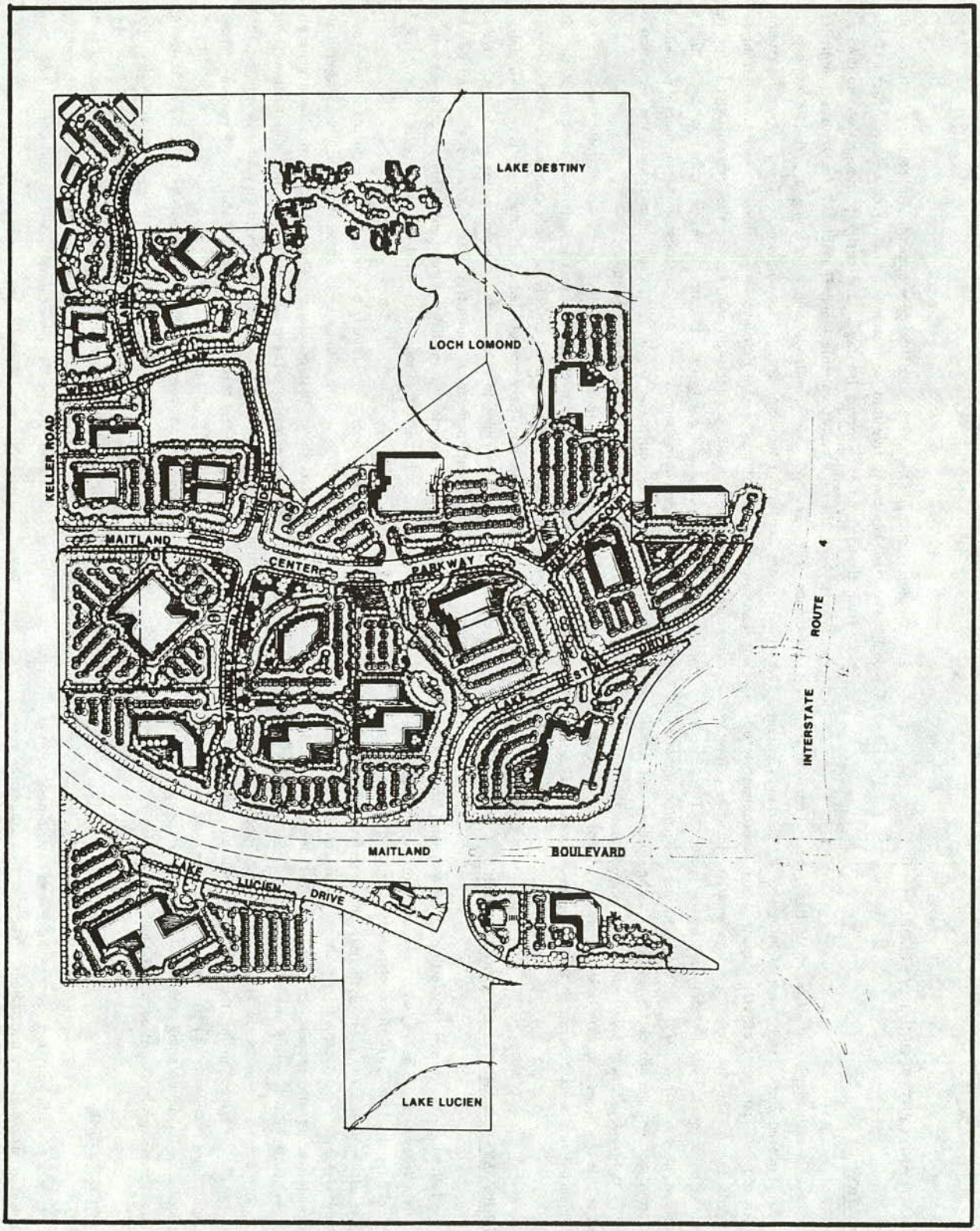
IMPLEMENTATION BACKGROUND

The key to the success of Maitland Center has been attributed to the development of design standards early in the project. These design standards were developed and adopted shortly after the property was taken over by the new owner, and completely changed the character of the development. The primary feature of the design standards is a thirty-five foot landscaping and utility easement, located 12 feet back from the curb on each street frontage. The design philosophy was to create a much wider area than normally available (approximately 47 feet), to accommodate meandering walkways and extensive landscaping, providing a park-like atmosphere even within the context of the commercial office buildings. Thus, a specific attempt was made to create a walkway system that was not restricted to exactly following the curvature of the street, which would traditionally place the sidewalk just inside the right-of-way and parallel to the edge of each street. Berms could not be as high in some places as might have been liked, due to constraints in meeting drainage requirements, but almost all areas do, in fact, contribute toward the sensation of walking through a park, rather than along the street.

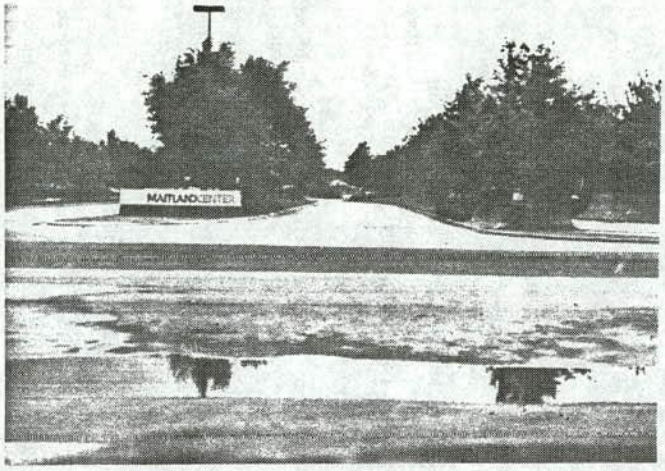
The requirement for individual site developers to install sidewalks and landscaping is controlled through covenants and restrictions that are part of the site purchase agreement. Each developer must comply to those standards. Although some developers of the individual sites have complained about how much is required and the respective cost, most have come to realize that the amenities are to their overall benefit. The idea of the pedestrian amenities was developed essentially as a marketing tool to attract tenants to a quality environment. This philosophy seems to have paid off, with a nearly eight-fold increase in land values over the last five to six years.

Developers have also been encouraged, but not required, to place pedestrian amenities at the entrances to their buildings or in other strategic places around the buildings. Experience has shown that developers who have done this have generally fared better in attracting tenants. There are obviously other significant factors involved in attracting tenants, however. It has been estimated that developers have spent $20,000 to $25,000 per gross acre in landscaping. Total site development costs are in the range of $70,000 to $80,000 per gross acre.

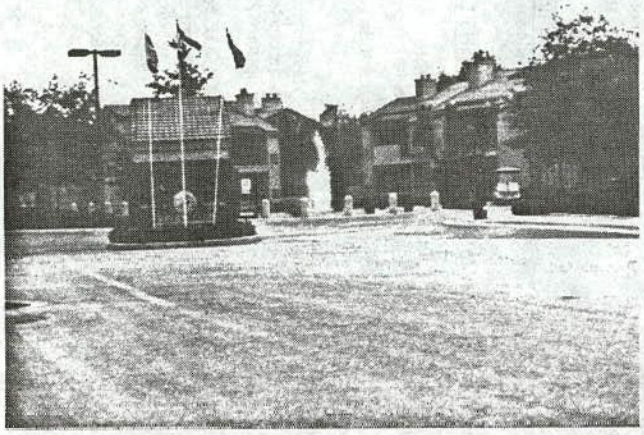
The site development was governed by design standards of the City of Maitland, but the development's owned self-imposed design standards were generally more stringent. For example, all walkways within the development are six feet wide, two feet in excess of the city's normal requirement. The design standards were conceived and developed by the design consultant, with review by the seller. At the time, no project involving this level of pedestrian-oriented design philosophy had been



Area Map of Maitland Center

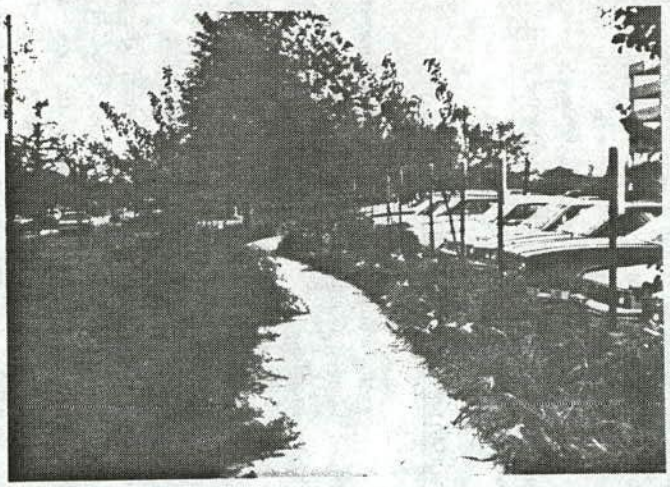


Major Entrance to Maitland Center pathways are behind clusters of trees on right and left.



Entrance to Sun Bay Club.

Most parking lots are also well landscaped.



Typical meandering walkway.

undertaken in the state of Florida. The designers, therefore looked at a variety of sites outside the state, most notably in California, and incorporated some of the best design features of each into the Maitland Center design.

Maintenance of the roads and landscaping was provided by the seller in the early years. It has been estimated that some $250,000 per year was spent in the early years on maintenance, paying particular attention to the quality of the landscaping. This included changing of the flowers by season, as part of the marketing strategy for the property. Recently, a property owner's association has been created, transferring maintenance responsibility from the seller to the individual developers. A monthly assessment, based on front foot of property, goes into a fund established for maintenance. Individual developers were apprised in their purchase agreements that this transfer of responsibility would eventually take place. Maintenance of parking lots and fringes of buildings is each developer's own responsibility. The pool of maintenance money assures that at least the most visible part of the development will be well maintained.

EVALUATION OF FACILITIES

The great amount of time and money invested in the planning and design of Maitland Center has resulted in one of the most enjoyable walking environments that might be found in any office or industrial park. Although the summer months are extremely hot and the trees are not quite mature enough to provide substantial shade during those periods, walking in the area during most of the year is quite enjoyable. Most of the walking is done at lunch, as there are small shops and snack bars located in the ground floors of some of the buildings. In the early morning hours, joggers from nearby neighborhoods frequent the walkways. There is not much interchange between the offices themselves during the workday, however, since each office is essentially an independent operation. There is one traffic signal within the complex, and there is a widely acknowledged problem with the AM and PM peak hour traffic congestion. Street crossings are made easier by the presence of medians on most streets. However, walkways across medians are not provided at some of the natural crossing locations.

The success of the development probably owes itself to the unique character of the development, accomplished through the planning, design and implementation process. From the beginning, Maitland Center was far superior to other office parks available in the area, and the expanding Orlando employment and population base added a great deal to the marketability of the property. More recently, other developments are following similar approaches.

The following is a summary evaluation of Maitland Center Pedestrian Facilities based on the defined set of criteria:

- Level of Use by Pedestrians - active during selected hours, and substantially more so than most other office and industrial parks.
- Accessibility - good; walkways connect all possible origins and destinations, but the curvilinear street system creates some circuity.
- Continuity of Path Longitudinally - excellent.
- Continuity of Path Laterally (across the roadway) - good, except for several locations where connecting walkways might have been provided across medians.
- Pedestrian Delay - none; no unreasonable delay problems exists.
- Level of Pedestrian Hazard - low; no sight distance problems were noted, and traffic streams are well disciplined.
- Directness of Pedestrian Paths - excellent, considering the street alignment; although curved street alignments can make for longer walking trips, they also tend to control vehicular speeds, a positive influence on walking safety.
- Aesthetics and Environmental Quality - excellent.
- Security - although crime statistics are unknown, little problem would be expected given that all walkways front on the street and do not go through secluded areas.
- Overall "Friendliness" of the Pedestrian Environment - excellent; one of the prime examples of a favorable walking environment.

SUMMARY OF LESSONS LEARNED

Enough time has passed in the development of Maitland Center for there to have been some significant lessons learned relating to pedestrians. Several of the major lessons are as follows:

- Quality development, although higher in cost, can be a major factor in a project's success. Dollars spent on amenities, provided they truly enhance the development, will usually pay off in the long run.
- A commitment to a well thought out set of design standards in the early stages of a project leads to the eventual provision of a cohesive, continuous pedestrian network. Design standards need to be tailored to the type of clientele desired or expected and need to be coordinated with local authorities. Design standards can be successfully enforced through lease and purchase agreements.

- A wider than typical area for provision of walkways and landscaping is an important element for creating the flexibility necessary to produce quality design. It may mean a slightly wider border area and less developable land than would be normally be provided, but this feature has, in the case of Maitland Center, been well worthwhile.

- Facility maintenance is an extremely important part of the entire development package and needs to be considered prior to development getting underway. Where multiple property owners are involved, the creation of an association to cover maintenance is a reasonable and workable idea.

BELLEMEAD OFFICE PARK, LYNDHURST, NEW JERSEY

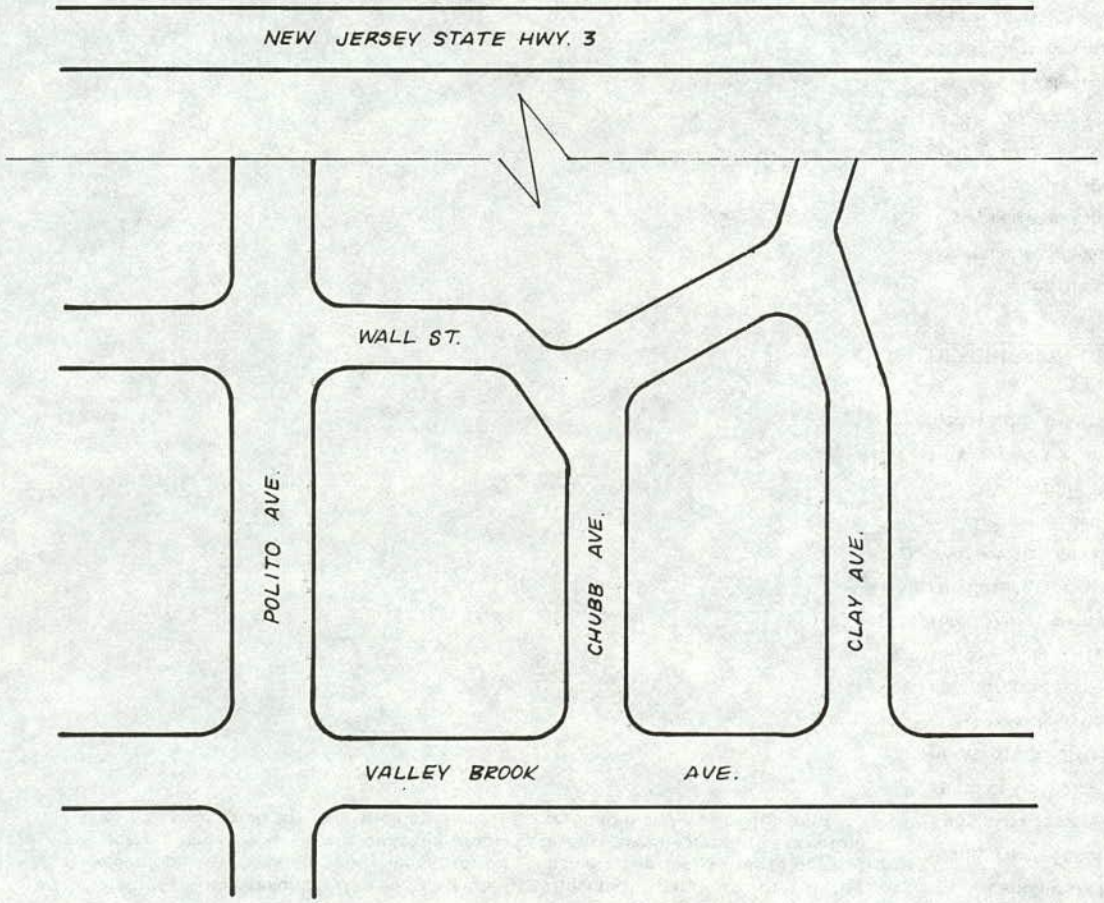
SITE LOCATION AND BACKGROUND

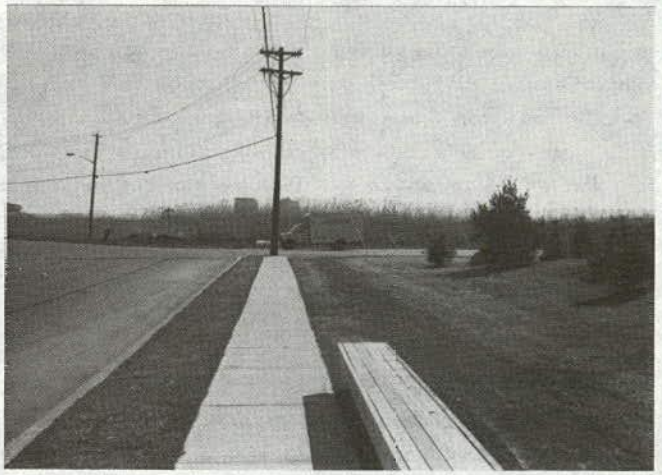
Lyndhurst, New Jersey, is located five miles west of Manhattan Island. Situated along New Jersey Route 3, one of the busiest highway corridors in the nation, Lyndhurst is one of the towns that make up the burgeoning Hackensack Meadowlands District (HMD). The HMD is an area of approximately 32 square miles encompassing parts of 14 different municipalities. Created by the state legislature in 1969, the HMD was designed to regulate the development of heretofore undeveloped parcels of upland and marshland areas along the Hackensack River estuary. The close proximity to New York City and vast tracts of land made the HMD a prime development area in the 1970s. With the legislation creating the HMD, the state legislature also set up a regulatory body, the Hackensack Meadowlands Development Commission, (HMDC) to oversee the development of the district according to a master plan and zoning code which superceded the municipal laws.

According to the HMD Master Plan, a large section of Lyndhurst Meadowlands was zoned for an office park. The development of the office park began in 1971. Today, the area has close to one million square feet of office space.

DESCRIPTION OF THE FACILITIES

The entire development lies east of Polito Avenue (see figure). There is no continuous sidewalk area within the network. Sidewalks have been built on a lot by lot basis, resulting in a discontinuous, uncoordinated pedestrian system. The sidewalk may extend across the frontage of one lot, and that will be the extent of sidewalk construction on that block. At times, the sidewalks leapfrog from one side of the road to the other. While there is bus service to the area from both New York and New Jersey locations, most of the bus patrons and other pedestrians in the area use the street to move around on foot. The pictures on the following pages show some of the characteristics of the facilities in the area.





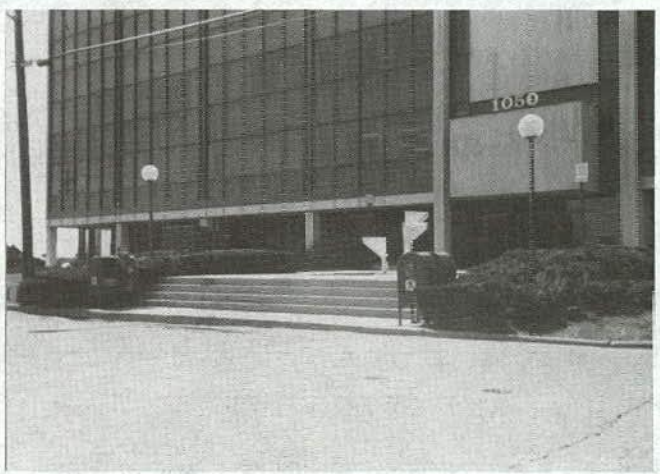
Sidewalk along Wall Street West.

Break in sidewalk for driveway. Note absence of ramped curbs.

Sidewalk ends between adjacent parcels.

Makeshift grave. sidewalk along Polito Avenue.

View from sidewalk to building entrance. You can not get there from here.



Good tie in of entrance to a sidewalk that goes nowhere.

IMPLEMENTATION AND FUNDING BACKGROUND

Sidewalk construction is not included as part of the HMD zoning and planning regulations for all zones. The code gives fairly broad discretionary powers to the HMDC Office of the Chief Engineer, including provision of sidewalks when deemed necessary. The checkerboard pattern of sidewalk development which has taken place in the office park is a direct result of the lack of any fixed requirements for sidewalk construction.

Initially, the developer was required to submit a subdivision plan for the area showing the layout of the lots and proposed roads to access the area. The rights-of-way for these roads were reserved at that time, as well as any future ROW that was considered necessary. As individual offices were developed, a site plan was submitted for each. These site plans would include building, parking lot and driveway location, as well as landscaping and drainage plans. During the site plan review process changes to the plan may be made by the HMDC Chief Engineer using the discretionary powers given to him by the codes. Over time, the technical staff of the Chief Engineers office have held varying opinions about the necessity of sidewalks in this area, and that is why sidewalk development has taken place in such an uncoordinated pattern.

EVALUATION OF THE FACILITIES

The lack of a continuous sidewalk network makes walking in the office park a very unpleasant proposition. While most people choose not to use the existing "network," by staying completely automobile dependent, many transit bus riders are forced to walk under very poor conditions.

The following is a summary evaluation of the Bellemead Office Park pedestrian facilities based on the defined set of criteria:

- level of use by pedestrians - fair; primarily bus patrons and people going to lunch.
- accessibility - poor; even if one walks in the road, there is no convenient way to get to the well set-back buildings without walking through parking lots between parked cars.
- continuity of path longitudinally - poor; gaps in the system everywhere.
- continuity of path laterally (across the roadway) - poor; often walking in the roadway, pedestrians will cross whenever or wherever they feel like doing so.
- level of pedestrian hazard - moderate; although the pedestrians must walk in the road in certain sections, the roads are quite wide with relatively moderate volumes of traffic.
- degree of conflict with vehicles - severe; walking in the road with vehicles creates many opportunities for conflict.
- clarity of directional information for pedestrians - poor; pedestrian routes are unclear.
- aesthetics and environmental quality - good; the area is well landscaped.
- overall "friendliness" of the pedestrian environment - poor.

SUMMARY OF LESSONS LEARNED

Without a coordinated plan and no local regulations to encourage or require such a plan, hopes for a well used pedestrian network are slim.

In the Bellemead Office Park, lack of any formal requirement to build sidewalks resulted in giving the option to build them to the developer. In most cases they were not built. It seems that in order to have assurance of a completed sidewalk network, it must be part of a formal requirement to build sidewalks along lot fronts. This alone will not guarantee a network that pedestrians will want to use, but it will, at least, provide on that they can use.

METRO EAST OFFICE PARK, NEW CARROLLTON, MARYLAND

SITE LOCATION AND BACKGROUND

New Carrollton, Maryland is a suburb of Washington, D.C. Located approximately 10 miles northeast of the city, New Carrollton lies astride the Capital Beltway (I-95) and Amtrak's Northeast corridor. The area has been a transportation hub and development center for over 15 years.

Activity in the area began in the early 1970's, when a new rail station was opened by Amtrak as part of a demonstration project, within the larger scope of the Northeast Corridor Improvement Program (NCIP). The demonstration proved to be so successful that the temporary station was to become a permanent station.

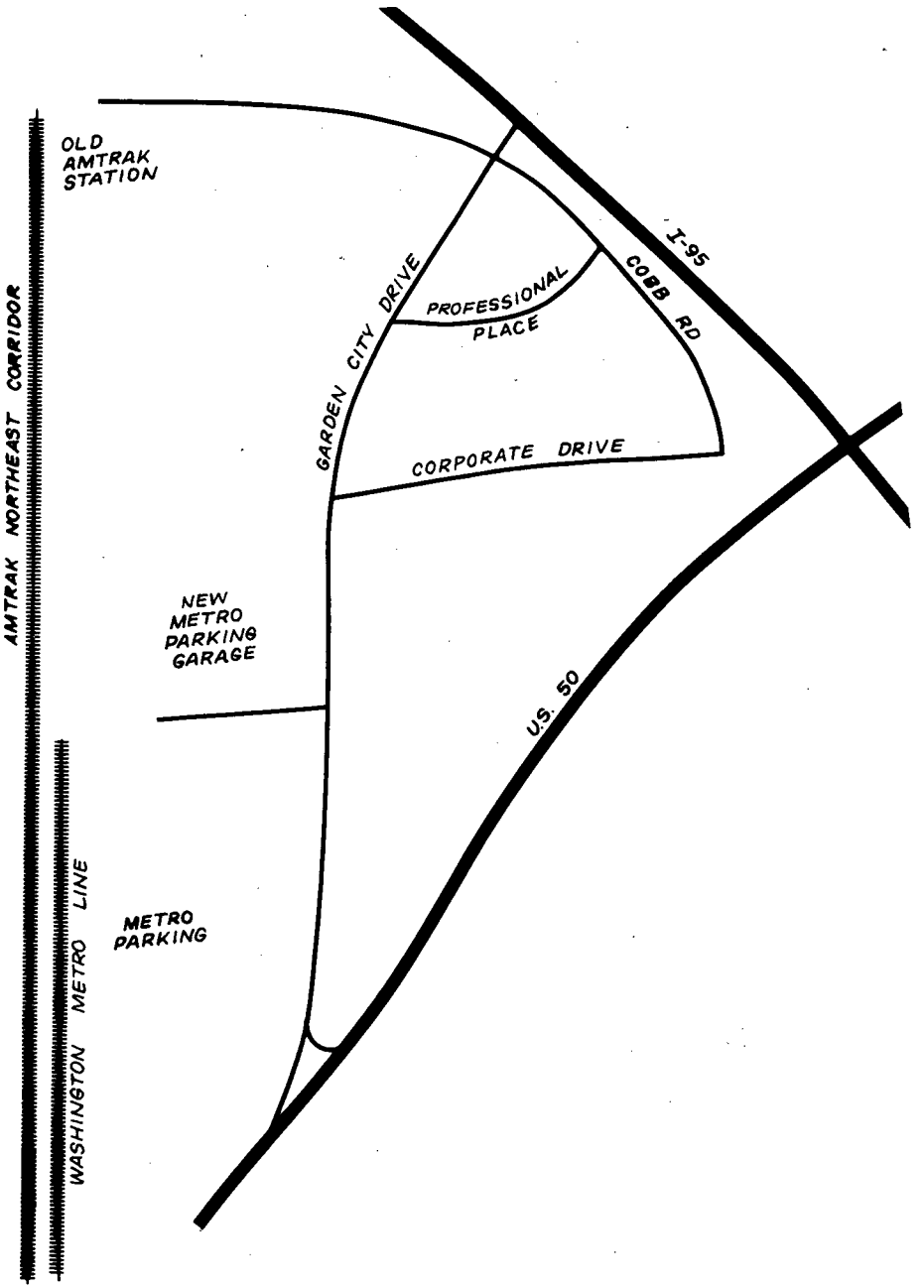
When the development of the Metrorail system for the Washington, D.C. region began, planners looked for right-of-way locations that would cause minimal disruption, had significant development potential and could be obtained at a minimal cost. The selection of a right-of-way adjacent to the existing Amtrak line became a natural choice. It was also decided that the new Amtrak stop in New Carrollton would be located adjacent to the terminal Metro station.

East of the Metro station was a large parcel of land owned by the Penn Central railroad. After the demise of Penn Central, the land went through a succession of owners who desired to develop an office park on the tract. Finally, the land was obtained by a new developer with sufficient resources to undertake the project. The developer made all the required improvements to the lots and then sold the improved lots to individual builders.

Today, the Metro East office development occupies over 100 acres of land with office space in excess of 1.4 million square feet.

DESCRIPTION OF THE PEDESTRIAN FACILITIES

The configuration of the street network at the site is shown on the following page. Access to the site is provided by Garden City Drive, a four-lane undivided arterial street. The office park lies to the east of Garden City Drive bounded by Cobb



Metro East Office Park and Amtrak and Metro Stations

Road and Corporate Drive. Wherever there are lots in the office park fronting or having side yards on these streets the developer has provided a planting strip and four foot wide sidewalks.

The development is connected to the train stations by a sidewalk running along the east side of Garden City Drive. This sidewalk extends down to the traffic signal at the entrance to the area near U.S. 50. There is also a short sidewalk from the Amtrak parking area to a crossing area at the signal near the Amtrak station (see figure).

The photographs on the following pages show some of the pedestrian facilities near the train stations and in the Metro East development.

IMPLEMENTATION AND FUNDING BACKGROUND

All of the sidewalk improvements in the Metro East office park were mandated through the regulations of local planning organizations. The Maryland-National Capital Park and Planning Commission is a regional agency with the responsibility for carrying out a land use and zoning plan for the national capital region in Maryland. According to their subdivision regulations, as part of a subdivision plan, a developer must reserve an appropriate ROW width for the streets in the subdivision. This width is specified by the Prince George's County Department of Public Works.

The sidewalks along the southern portion of the Garden City Drive accessway were built long before the development of the office park, as part of either Amtrak or Metro activities.

EVALUATION OF FACILITIES

As far as the pedestrian environment is concerned, Metro East would have to be classified as a missed opportunity. While the individual facilities are there, the network does not seem to function well as a whole. The most notable weakness in the system is the long walking distances, both between buildings and from most buildings to the Metro station, dictated by the overall land use density and spatial relationships.

Garden City Drive acts as a major pedestrian barrier between the office park and the Metro station. The straight alignment contributes toward unnecessarily high vehicular speeds. The lack of a median makes crossing difficult and dangerous at locations other than the traffic signal. Although it is probably too late for a median, carefully placed and marked refuge islands would add substantially to the convenience

Sidewalk entering the area from U.S. 50 with crossing of Garden City Drive. Note worn path after the sidewalk ends.

Sidewalk from Amtrak parking area to the crossing of Garden City Drive. Note worn path up the east side of Garden City Drive.

of crossing Garden City Drive. Ideally, Garden City Drive could have been built with a curvilinear alignment and portions of it even relocated toward the east so that fewer pedestrians would have to cross it at all. This would have also enabled more of the office development to be located closer to the station. Development densities closer to the Metro station could also have been increased. The timing of development and the land ownership patterns would probably have made the realignment of Garden City Drive difficult, however. Although there are proposals for joint development next to the Metro station, the loss in pedestrian efficiency of the existing development will be difficult to recover. Needless to say, however, there were many other priorities that had to be considered, and the practicality of modifications to enhance the pedestrian system is difficult to assess.

The path leading from development on the south side of U.S. 50 into the office park itself could also use some improvement. People from outside the area are assumed to be walking to the Metro station, and the path provided to the station seems to be the most direct. However, the ruts worn in the grass along the east side of Garden City Drive beyond where the sidewalk ends (see photo) show that many people are using this route as well, and are making the dangerous maneuver of crossing the ramp that brings the westbound U.S. 50 traffic into the area.

The sidewalk facilities provided within the office park itself are very good, but there are no well defined paths from the sidewalks across the front yard setbacks to the buildings. The following is a summary evaluation of the facilities based on the defined set of criteria:

- level of use by pedestrians - fair; pedestrian trips between the Metrorail station and the office park, and between Metrobus stops located in the Metro East complex and individual buildings is only moderate during the peak hours.
- accessibility - fair; curb ramps are provided at most locations with the exception of the key link at the intersection of Garden City Drive and Corporate Drive.
- continuity of path longitudinally - good; all locations are joined by a sidewalk, but there remains a key missing link on Garden City Drive.
- continuity of path laterally (across the roadway) - fair; speeds on Garden City Drive make the crossings there the weakest link in the network.
- pedestrian delay - low; no real impediments except crossing Garden City Drive.
- level of pedestrian hazard - moderate; speeds are high on Garden City Drive, but clear sight lines make the area relatively safe.

Sidewalk ends along west side of Garden City Drive.

Buildings can be accessed from the sidewalk only through the parking lot.

- degree of conflict with vehicles - moderate; during peak hours heavy vehicular volumes can cause problems.
- clarity of directional information for pedestrians - fair; crosswalks are worn; no real directional information other than street signs.
- directness of pedestrian path - fair; paths generally follow street alignment; however, many areas without sidewalks show heavy pedestrian use.
- clarity of information provided to drivers - good; some signing is provided.
- aesthetics and environmental quality - fair; in the office park, areas are landscaped; along Garden City Drive environment is rather stark.
- security - good; all areas are well lit and there are no apparent crime or vandalism problems.
- overall "friendliness" of pedestrian environment - fair; the facilities are there, but there is no real inducement to use them.

SUMMARY OF LESSONS LEARNED

The Metro East office park is a fine example of doing things "by the book". No one can argue that the facilities provided are not up to established minimum standards, but the overall planning of the network seems flawed. There is no feeling that the office park and the surrounding transportation facilities, the proximity of which helped to spur the development of the office park originally, are accessible on foot. The long walk from the stations to the offices is due to the relative locations of the properties. There is little that can be done about this now. The walk along Garden City Drive is rather bleak and uninviting and could have been altered dramatically by the addition of a landscaped median. Adding a sidewalk to the other side of Garden City Drive would have also helped. This section of the network is not controlled by the developer, and these improvements would have required additional County input and funding. Although everyone involved has complied with the regulations it appears that the total system is not as effective as it could have been. Most likely, there was little specific thought given to pedestrian needs in the planning stage and no local staff person to serve as a pedestrian advocate.

As was mentioned earlier, the Metro East complex is a missed opportunity for creating a good pedestrian and transit environment. Originally, the development was planned with a highway orientation, and that is reflected in the current transit usage rate (three percent for Metrobus and rail combined). While current planning is attempting to correct this, these efforts may be too late.

SITE TYPE AND LOCATION

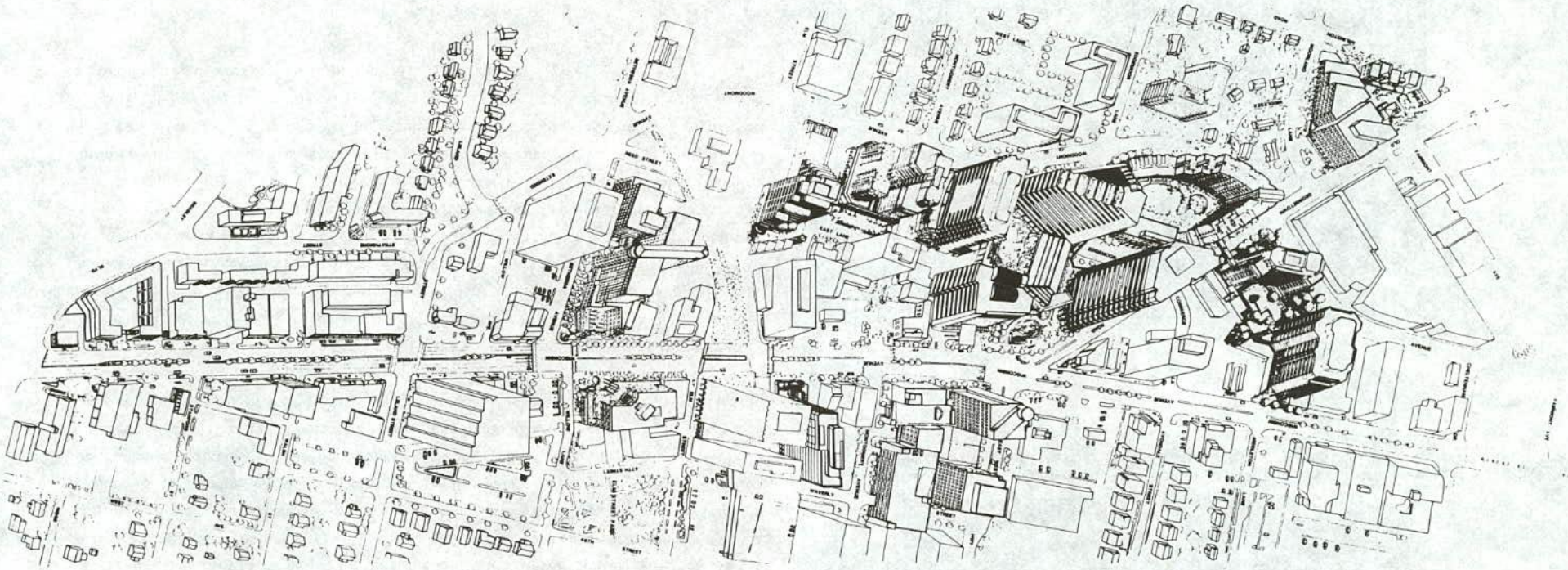
Bethesda is a thriving suburban business district surrounded by single-family residences, mostly older homes, considered one of the more affluent residential areas in Washington. The community is located northwest of the District of Columbia, approximately two miles outside the District line.

The recent (late 1984) opening of the Red Line to Shady Grove Metrorail line through Bethesda has spurred much redevelopment within the core of the commercial district. Prior to Metro, existing development within the commercial core consisted of low-rise structures with scattered high-rise developments. After Metro, most redevelopment is concentrated within a three-block radius from the Metrorail station in accordance with the staging of the Master Plan.

DESCRIPTION OF PLANNING, EMERGING STREET SYSTEM AND PEDESTRIAN FACILITIES

The major north/south arterial running through Bethesda is Wisconsin Avenue (see figure), which forms an organizing spine of retail businesses. The Metrorail Red Line follows the Wisconsin Avenue route through the length of Bethesda with the rail station located at the traditional crossroads of the street system. The major east/west streets providing access to Bethesda are Old Georgetown Road and East-West Highway.

As a result of innovative planning and zoning practices, Bethesda's pedestrian system and amenities are becoming quite extensive. A zoning option known in Montgomery County as the Optional Method of Development allows developers to increase density if an acceptable public amenity package is included in the proposed development. The zoning tool requires an experienced design staff capable of negotiating desirable public benefits. These public amenities focus specifically on the enhancement of the pedestrian environment coupled with activating retail and programming for plaza spaces.



Bethesda Central Business District

In 1980, the Park and Planning Commission established in Bethesda's Master Plan a traffic ceiling and a staging plan designed to focus redevelopment around the Metrorail station and mitigate impacts upon the surrounding residential neighborhoods. Because the market demand in Bethesda exceeded the available traffic capacity, a competition resulted between well-financed developers vying for County approval. The Park and Planning Commission found itself in the enviable position of ranking the outstanding proposed optional method developments and approving only nine out of the ten projects proposed. The unique situation also enabled the urban designers to coordinate the urban form relationships and pedestrian connections between all nine projects at one time rather than second guessing how slower, incremental growth may or should occur.

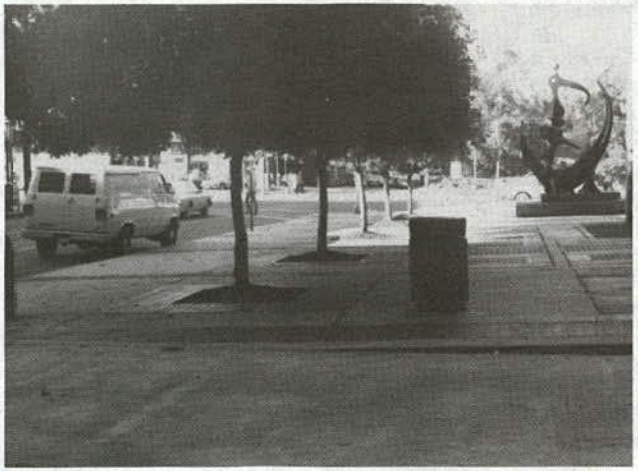
The Clark Enterprises Building and the Bethesda Metro Center are a few of the earlier Stage I developments (1982) which included extensive pedestrian amenities, such as sculpture and a cascading water fountain at the Metro entrances. Within the primary plaza there is winter-time ice skating and substantial outdoor seating opportunities adjacent to a food court pavilion. These two projects were jointly required by the County to construct the pedestrian plaza on top of the Bethesda Metrobus and Kiss and Ride facility, with an escalator entrance to Metro integrated into the plaza design. The pedestrian plaza also connects with a continuous pedestrian pathway that links a series of outdoor amenity spaces throughout the CBD currently under construction (see figure). Several of these Stage II developments have provided community-oriented features such as a calendar wall of local events and bronze plaques telling Bethesda's local history. Streetscape improvements were required of all developers. Streetscape improvements included seating, special paving, lighting and street trees, thus creating an attractive streetscape setting for the pedestrian as well as the motorist. The streetscape plan designed by the Park and Planning Commission is intended to create a continuous, unified appearance to the diverse CBD when completed. One of the primary objectives of the plan was to add significant amounts of greenery to the urban scene to reduce the contrast between the surrounding residences and the commercial center.

Wisconsin Avenue - the major north-south artery. The median and trees make it a less hostile environment. The traffic itself tends to keep speeds slower than might be expected for an arterial.

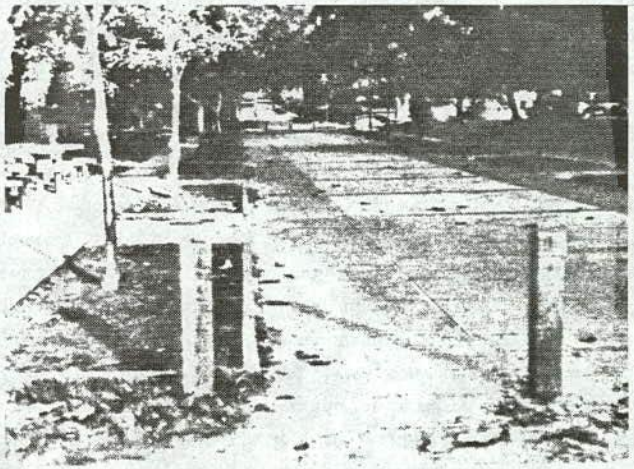
Median on east-west highway

Nice landscaping was provided here, but is almost too sterile. Plantings at the road edge would have helped.

The gas station at this corner is provided with simple, but effective landscaping and attractive sidewalk paving.



Sample of improvements provided through optional method of zoning.



This small park connects the CBD with the residential areas to the east. It is also an effective buffer.

IMPLEMENTATION AND FUNDING BACKGROUND

A planning goal in Montgomery County is to achieve an environment which encourages pedestrian movement and public activity. In addition to the Master Plan's recommended zoning, the primary tool for achieving this objective is use of a zoning tool termed the Optional Method of Development, which allows for increased density in exchange for public amenities. The following is a list of the Park and Planning Commission's criteria of pedestrian amenities which developers must provide in order to be granted approval of increased densities.

- link and extend pedestrian pathways outward from Metro;
- install sidewalks and pathways in both the public right-of-way and privately owned areas;
- provide attractive and accessible places and spaces that accommodate and encourage a wide variety of public activities;
- enhance the sidewalk environment by means of appropriate materials, landscaping, lighting, graphics, street furniture, and design;
- encourage pedestrian activity by providing shopping or entertainment opportunities along pedestrian ways, including the retention or relocation of existing retail uses;
- provide pedestrian systems and street crossings that encourage more trips on foot; and
- implement other attributes which improve the pedestrian environment and pedestrian access to Metro.

In the process of evaluating individual projects, the Park and Planning Commission's streetscape plan was incorporated into the project's proposals. It was designed to enrich the quality of the pedestrian experience in addition to improving access, safety, and comfort. Approximately 70 percent of the streetscape plan is being funded and constructed by the private sector developers whose projects were approved by the Commission. The remaining segments of streetscape are funded by the County's Capital Improvement Program, known as the Gap program. Implementation of the streetscape plan has taken place virtually at one time in conjunction with the approved projects, thus creating a series of construction sites temporarily inconveniencing pedestrian and adding to the traffic congestion. The photographs on the following pages exemplify some of the pedestrian improvements occurring within Bethesda.

EVALUATION OF FACILITIES

Bethesda is an excellent example of a redeveloping suburban activity center providing an extensive amenity package through flexible zoning techniques. When construction of the redevelopment area is complete, Bethesda will have an elaborate mixed-use development with its pedestrian plazas conveniently connected to the transit station. With the input of the Bethesda business community and the residents, the pedestrian amenity package has been tailored to meet the local needs.

There are a few areas of concern with Bethesda's pedestrian system. Much of Bethesda's commercial core is undergoing redevelopment. Construction sites are frequent occurrences and walking in these areas is not very pleasant and may even be hazardous. This is a temporary inconvenience, however, and pedestrian facilities will be greatly improved when these developments are complete. Sidewalks in some locations have been neglected and are in need of maintenance or repair. Shrubs or weeds are becoming overgrown occasionally, leading to hazardous walking situations.

The provision of sidewalk extensions is another area of concern. It is complicated by the numerous landowners and businesses affected. Developers are required to provide sidewalks adjacent to their property, but the distance they are required to extend them is negotiable. Developers are reluctant to fund sidewalk extensions that are too great a distance from their development. As a result of these discontinuities, funds were requested for the Bethesda planning area to fill in the gaps between private developments. The result was a capital improvement program, entitled the "Gap Program", which has earmarked 5.7 million dollars for the connection of missing links in Bethesda's pedestrian system.

The following is a summary evaluation of the Bethesda pedestrian facilities based on the defined set of criteria:

- level of use by pedestrians - active.
- accessibility - eventually good, but construction is a major pedestrian obstacle at this time.
- continuity of path longitudinally - fair; construction at some points is causing pedestrians to walk in the street. But, again, after development is complete, the pedestrian system will be extensive.
- continuity of path laterally - good; street widths tend to be wide but medians (with curb cuts) are provided, which facilitate pedestrian crossings.

- pedestrian delay - moderate; traffic is generally heavy in the area.
- directness of pedestrian path - good; this will be excellent when the pedestrian pathway improvement is complete.
- clarity of directional information for pedestrians - average; little or no signing exists to help pedestrians.
- aesthetics and environmental quality - good; walking is pleasant around sites that have been redeveloped. Sidewalk paving and landscaping is well designed.
- security - fair; walking after dark when businesses close may be unsafe.
- overall friendliness of pedestrian environment - good to excellent. After redevelopment is complete, Bethesda will offer an attractive walking environment.

SUMMARY OF LESSONS LEARNED

The private/public sector effort in Bethesda is contributing to a successful pedestrian environment. With innovative planning, such as the staging and zoning, the streetscape plan, and the Optional Method of Development, Bethesda has been able to secure a series of pedestrian amenities. An important point in Bethesda's success is the County's scarcity and popularity of developable land. Montgomery County has placed a limit on the amount of development permitted. Consequently, the County is able to use its leverage to require the implementation of public amenities. The key to providing the overall guidance for a coordinated pedestrian system in a redeveloping suburban activity center is a thoughtful, implementable subarea plan. Public agencies must produce such a plan at an early stage if an effective pedestrian program is to be accomplished.

BALLSTON/PARKINGTON AREA, ARLINGTON, VIRGINIA

SITE TYPE AND LOCATION

Arlington County is a suburban jurisdiction just across the Potomac River from the District of Columbia. It is an older suburban county, with much of the development predating World War II. In the past ten years, the county has undergone substantial commercial redevelopment, much of it stimulated by the location of rail transit stations along two lines of the Metrorail system. One of the stations around which redevelopment is occuring is the Ballston station (see figure). Also known as Parkington, the Ballston area is composed largely of commercial retail development, mixed with over 1,000,000 square feet of office space. A major redevelopment of the retail core, located one block from the Metro station, is currently in progress. There is a substantial amount of high and low-rise residential development in the Ballston area, and single family homes are located within two blocks of the Metro station. The site is located approximately 5 miles from downtown Washington.

DESCRIPTION OF STREET SYSTEM AND PEDESTRIAN FACILITIES

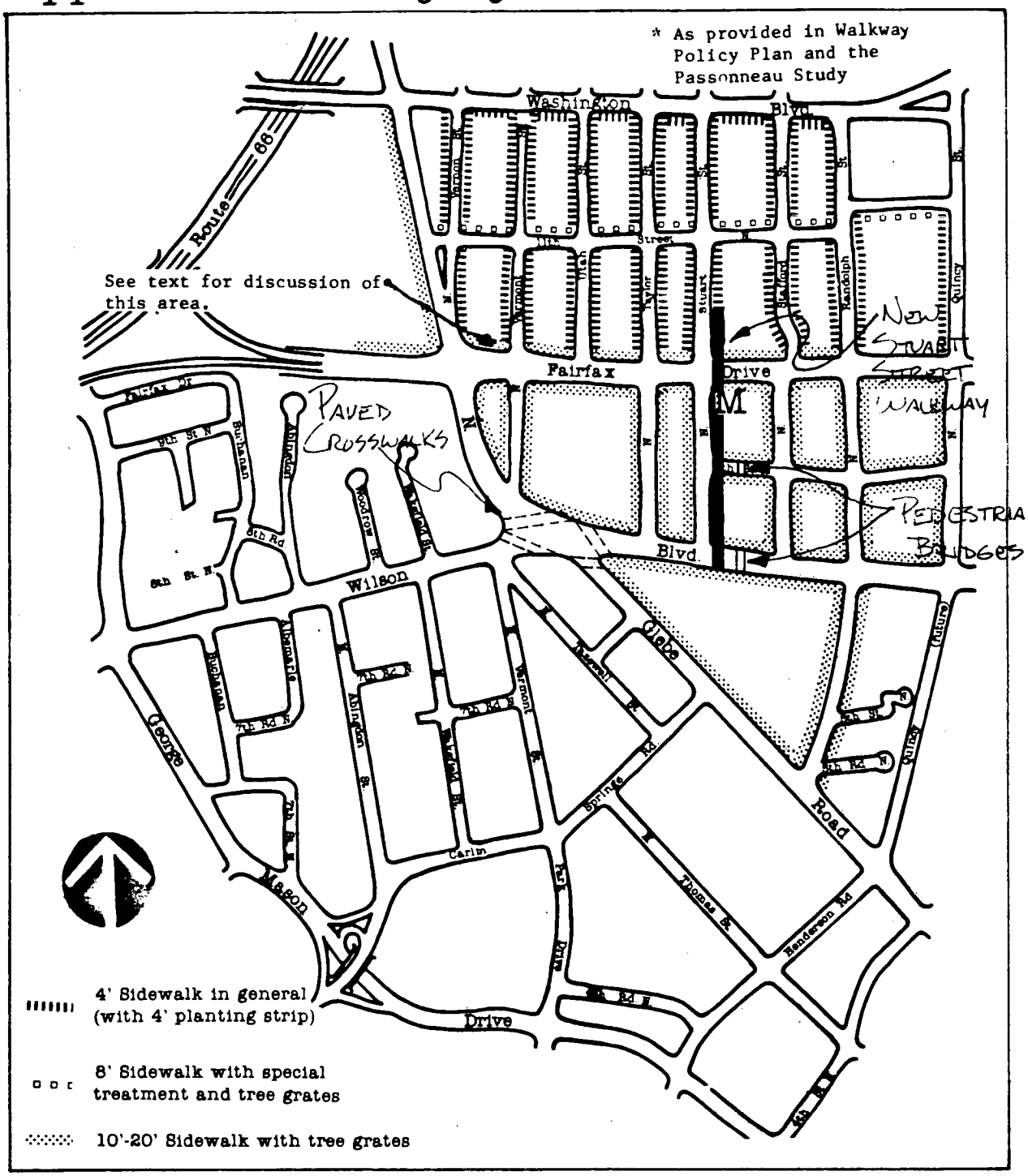
There are four major streets that pass through the Ballston area, as indicated in the figure. Wilson Boulevard, Washington Boulevard and Fairfax Drive are the primary radial routes, and Glebe Road serves as a major cross-county facility. All but Washington Boulevard are four lanes, and both Fairfax Drive and Glebe Road are divided roadways. The photographs on the following pages depict some of the characteristics of the highway and pedestrian facilities in the Ballston area.

The sidewalk system in the Ballston area is already quite comprehensive, but certain portions remain fairly bleak pedestrian environments. This is particularly true along Wilson Boulevard, where building setbacks are short and landscaping is provided in only a few spots. There is at least one major missing link, a connection from the residential area north of the Metro station.

Considerable attention has been given to the planning of pedestrian facilities in the Ballston area, motivated both by the location of the Metro station and by the high density development nearby. Travel surveys at a nearby high-rise office building indicate that approximately six percent of the employees in the Ballston area walk to

Map 22

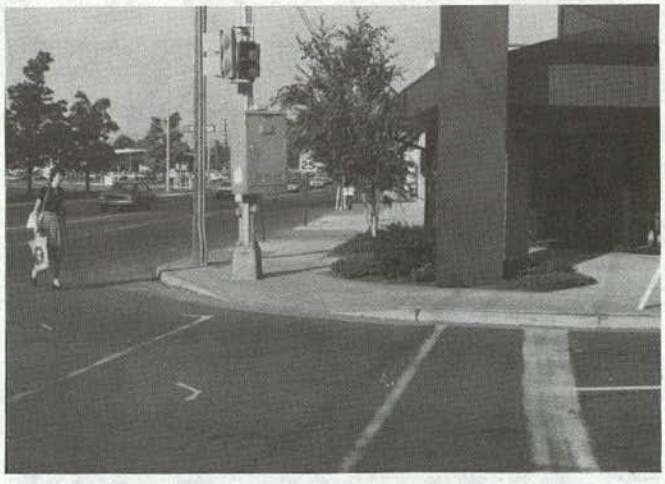
Approved Walkway System



Walkway System Ballston Metro Station, Arlington, Virginia

Fairfax Drive looking toward Metro station. Intersection is more wide-open than necessary. Medians could be extended to provide better refuge for peds on this major approach route to station.

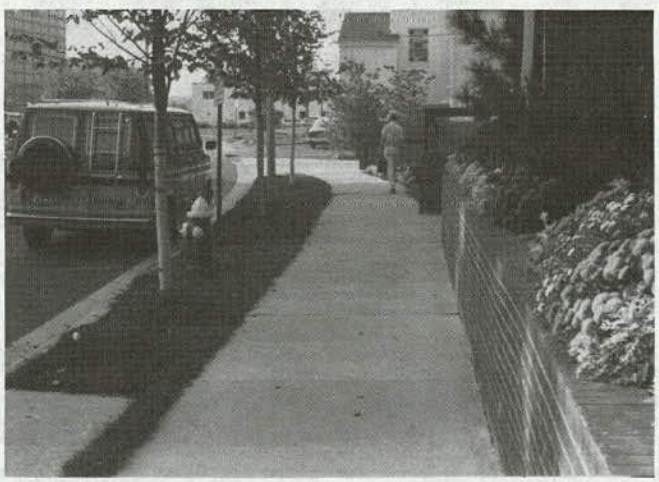
Stuart Street improvement, linking Metro station with retail core. Note pedestrian-level lighting. This entire area will be rebuilt as part of the Metro block redevelopment.



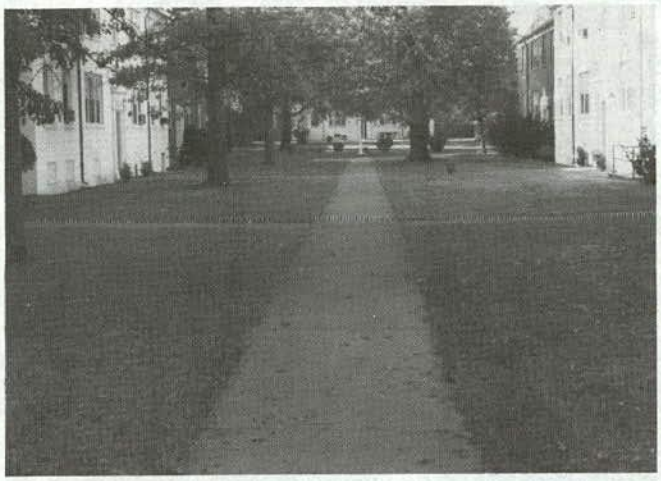
Wilson Boulevard is difficult to cross, except at signals, and could be provided with refuge islands or a narrow median at selected points. Spot landscaping has reduced starkness of wide sidewalk. Controller cabinet impinges on ped path and might have been better placed on opposite side of pole.

Turning island is unusually well-designed for peds, and encourages proper crossing behavior. Paved crosswalks will be added at this intersection.

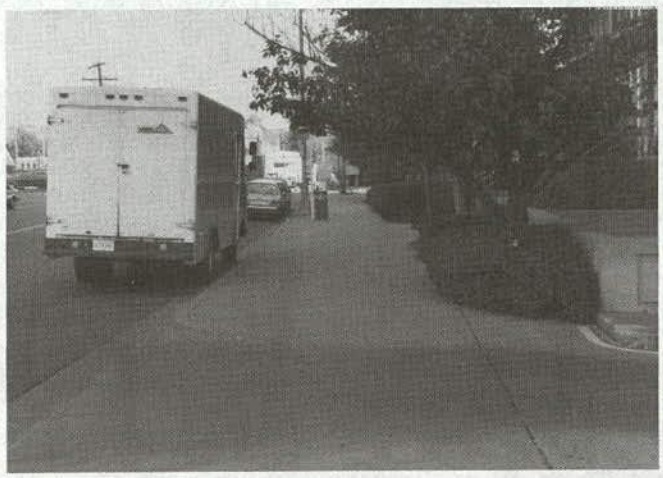
Pedestrian approach to Metro station is nicely landscaped, but awkward. Simple opening in fence could have alleviated this problem.



Walkway in front of this new residential development is nicely done but ends abruptly at church property. Easement or street narrowing will be needed if site is not redeveloped.



Peds can divert through this complex if they want to get away from traffic.



Other walkway links create a pleasant atmosphere even in the midst of the high-rises.

Major pedestrian link from north residential area provides enjoyable walking environment.

This site has deteriorated and must await redevelopment. Clear pathway should be maintained through public enforcement or direct public involvement.

work. This is typical for a higher density mixed-use suburban activity center. Streetscape improvements have been given high priority, having been initiated by the public sector and now being supplemented by the private sector as individual parcels redevelop. However, much of the Ballston area remains without redevelopment, and the age of the existing pedestrian facilities is clearly apparent.

The Stuart Street improvement was initiated by the county's Economic Development Commission, which initially suggested the expenditure of public funds for these types of improvements to further stimuate development around the Metro station. Similar treatments have been provided on the frontage of some properties as they have redeveloped. Most of the improvements have included a planting strip next to the curb. Deciduous trees have also been planted in the median of Fairfax Drive, adding to the aesthetic character, but the effect will be more prominent as the trees mature. County Capital Improvement Program monies are being used in some places to fill in gaps in pedestrian system.

IMPLEMENTATION AND FUNDING BACKGROUND

Arlington County is focusing much of its redevelopment attention around Metro stations. Streetscape improvements have been integral to this redevelopment effort. The County has addressed the pedestrian needs of Ballston and other areas in the Master Transportation Plan, and more specifically, in the Master Walkways Plan. The master plan gives extensive treatment to walkway network policies, width principles, design policies, financing policies, and construction, operation, and maintenance principles. The Ballston Sector Plan devotes more specific attention to land use and transportation planning in the Ballston subarea. An excerpt from the plan relating to walkway policy is attached.

The major influence on streetscape, however, was a study conducted in 1979 entitled Street Design For Ballston. This study established design principles and guidelines both overall and on a street-by-street basis for the Ballston area, and has been generally followed as redevelopment has occured. An advisory committee, composed of residents and merchants, provided input to the study. There has been relatively little resistance by developers to the provision of these improvement on the frontage to specific parcels, as they have generally recognized the improvements to be in their own long-term interest, as well as the interest of the community. Currently, the County staff is also drafting a set of streetscape standards for the Rosslyn-Ballston

Metro Corridor including details of sidewalk widths, brick paver treatments, street tree planting, etc.

It has also been the desire of county planners to place existing overhead utilities underground. On their own sites, the developers are required by the county to place all utilities underground. However, this leaves the existing lines still overhead. In an effort to provide additional funding for this, a system was set up to assess developers for a share of the costs for undergrounding the trunk lines, as well as the access for the developers' own on-site utility improvements. This sharing of costs has met with a great deal of resistance, and it is questionable how much of the funding can actually be achieved in this way.

EVALUATION OF FACILITIES

Although Ballston is still in a state of transition, it is evident that a substantial reorientation toward pedestrians is taking place. Although the driving force behind this reorientation is, of course, the rail transit station, it is clear that the pedestrian facilities themselves are contributing significantly to the walking atmosphere. The existence of a coordinated plan for these facilities will increase the chance of a complete pedestrian system being in place sooner or later.

One of the disadvantages of waiting for individual parcel redevelopment in funding pedestrian improvements is that, in the interim, there will be discontinuities in either the sidewalk system itself or in the visual cohesiveness of the streetscape. One of the requirements for this approach to work is that all of the parcels must eventually be redeveloped and/or the property owners must take the initiative to improve the site on their own. Even with the relatively rapid pace of construction it will likely be years before all of the improvements are in place. Public financing of some of the improvements in advance of development, with a mechanism for reimbursement by developers once development occurs, would provide a complete system at an earlier date.

The absence of a key pedestrian linkage from the link feeding from the residential areas into the Metro station area was already alluded to. Pedestrians either walk over the grass or around the property into the street. The site is now occupied by a church, the property of which abuts the street right-of-way. The property is several feet above street level, and pedestrians routinely walk in the street. Solution to the problem is difficult without redevelopment of the site. Ideally, the County could acquire a large enough slice of the property to provide this connection.

Several of the intersections near the Metro station are well designed, while others could be improved. The intersection of Glebe Road and Fairfax Drive, for example, is very well channelized, with street-level pathways through the channelizing islands. These are also landscaped, guiding pedestrians into the proper crossing locations. Near the Metro stations, however, intersections are more wide-opened than needed, and the many pedestrians crossing Fairfax Drive feel more exposed to traffic than necessary. Pedestrians would be better off if the parking lane were eliminated and Fairfax Drive were narrowed near the station, but the removal of parking does not generally meet with merchant favor.

Interviews with pedestrians near the Metro station indicated that most rated the safety of their walking in the area as good to fair. Pedestrians responded more favorably to the convenience and pleasantness of their walk, with almost 3/4 rating it good and 12 percent rating it excellent. One would hope that this is at least partially due to the efforts put into the improvements thus far.

The following is a summary evaluation of the Ballston pedestrian facilities based on the defined set of criteria:

- level of use by pedestrians - very active; peds are generally using intended walkways.
- accessibility - good; however, construction activities are currently a significant inconvenience to pedestrians on several streets; most intersection curbs are properly ramped.
- continuity of path longitudinally - good, except in one or two locations where links are currently incomplete, as described previously.
- continuity of path laterally (across the roadway) - fair; with three major streets closely paralleling one another, traffic volumes are not so high as to be difficult to negotiate; traffic signals are frequent, to assist pedestrians in their crossings, and produce gaps in traffic at unsignalized crossing locations; however, cross-sections on Fairfax Drive are wide, and Wilson Boulevard is undivided, providing no pedestrian refuge.
- pedestrian delay - none; signal timing is good, and no unreasonable delay problems exist.
- level of pedestrian hazard - low; traffic streams are well-disciplined, and no unusual geomtrics or sight distance problems exist; several intersections are more wide open than necessary.
- clarity of directional information - fair; little or no signing is provided to the Metro station or other major facilities; much could be done with simple signing schemes to direct unfamiliar pedestrians both to and from these facilities.

- directness of pedestrian paths - excellent; routes are as direct as could be expected for a densely developed setting, and major facilities are well-connected.

- aesthetics and environmental quality - good; there are some signs of litter and uncleanliness, and the building construction makes the area look messier than it eventually will be; the streetscape improvements are significantly enhancing the appearance, and some of the side streets are excellent walking environments.

- security - crime statistics are unknown; there are no secluded walkways, but there are some which would be devoid of people and cars at night, possibly posing a security problem; street lighting is adequate.

- overall "friendliness" of the pedestrian environment - good; it is maturing into a pleasant area for walking.

SUMMARY OF LESSONS LEARNED

Since Ballston is still at the early stages of redevelopment, it is too early to make a final judgement on the degree to which a coordinated, comprehensive network is likely to be provided. However, it is clear that the attention given to pedestrians in the planning stage is beginning to reap benefits in terms of system continuity and effectiveness from both the functional and aesthetic viewpoints. Arlington County's experience suggests that the following elements are all important in the planning, design and implementation of pedestrian facilities for an area such as this:

- Establishment of overall pedestrian policies and standards
- Coordinated planning of smaller subareas
- Establishment of specific guidelines and principles for design within that subarea
- Reliance on private funding of pedestrian facilities for most frontages, but public funding for key links to ensure system continuity

Experience elsewhere in Arlington County also indicates that development is not necessarily a prerequisite for pedestrian improvements. A number of areas elsewhere in the County (including strip commercial and shopping areas) are being enhanced through streetscape improvements.

TYSON'S CORNER, MCLEAN, VIRGINIA

SITE LOCATION AND BACKGROUND

McLean, Virginia is a suburb of Washington, D.C. The Tyson's Corner area of McLean is nominally the area surrounding the intersection of Virginia Route 7 and Virginia Route 123 (see figure). In the 1960's much of the land in the Tyson's area was farmland. Over time, many of the large farm properties were sold, subdivided and turned over to commercial and residential uses. Today the Tyson's corner area is one of the most intensely developed areas in the Washington, D.C. region outside of the center city. Development includes a regional shopping mall (soon to be expanded to over 1.5 million square feet), substantial strip commercial development along the major arterials, and a large office park area which is still growing. The Tyson's area is typical of many of the satellite business districts one associates with booming suburban development.

DESCRIPTION OF THE PEDESTRIAN FACILITIES

The Tyson's Corner case study has been selected as a prime example of a suburban development style that thwarts pedestrian convenience and safety. The only continuous pedestrian facilities in the Tyson's area are located in the office park, north of Virginia Route 7. At every property frontage, there is a four-foot wide sidewalk. As with many other office developments, however, there are few connections between the sidewalk and building entrances. In most instances, pedestrians are required to cross an open parking area to access building entrances.

The rest of the area is typical of the strip commercial development of the 1950's and 1960's. Commercial/retail facilities are well set back from the road and parking is on several sides, including property front yards. The parking areas are accessed by service roads running parallel to the main roads. Although there is ample space to provide sidewalks in the median separating the main and service road or in the planting/utility strip between the service road and the parking lots, they are rarely found. While the median between the main and service road hardly seems like a good place to have a sidewalk from a pedestrian comfort standpoint, these areas are among the most heavily used pathways by pedestrians, as evidenced by many dirt paths.

The photographs on the next few pages show some of the pedestrian areas at Tyson's Corner.

Typical view of Tyson's Corner, showing spatial separation of buildings, open parking lots and no sidewalk.

Dirt paths are can be found in many locations.

Sidewalks are being provided in some of the newer areas. A median or refuge island would have helped the pedestrian crossing situation here.

IMPLEMENTATION AND FUNDING BACKGROUND

For the most part, the planning, implementation, and funding decisions have been in the hands of the private sector. Initial development in the Tyson's Corner area was slow. The current intense development level was not anticipated and only recently have tighter regulations been exercised over the developers. Tyson's is typical of many other suburban areas in that the eventual level of development that is now generating pedestrian demand was not foreseen, and the provision of sidewalks, the most basic of pedestrian facilities, was overlooked. No plan was available to guide the provision of pedestrian facilities within Tyson's Corner, and local ordinances did not require the construction of sidewalks along with property development. Several years ago, an attempt was made by a private group to provide mid-day transit service to allow for increased mobility within Tysons. Insufficient demand resulted in the service being discontinued.

EVALUATION OF THE PEDESTRIAN FACILITIES

Life as a pedestrian in the Tyson's Corner area is not a pleasant proposition. Most of the area has no sidewalks. Distances between buildings are painfully long, even with the relatively high density. There is nothing that encourages walking as a means of travel. One of the reasons is that most of the parking is in surface lots, rather than structures. In the initial stages, surface parking was most economical. Under the current situation with much higher land values, more developments are providing structured parking, which tends to lessen distances between buildings. In a sense, Tysons is dense, but not dense enough to truly foster pedestrian trip making. Data from this study indicate that approximately 15 percent of mid-day auto trips from Tysons office buildings are less than half a mile. Walk trips to work are almost non-existent, probably due to the significant lack of residential development in the area. Pedestrian links from surrounding single family residential areas are indirect, and there is little multi-family residential development mixed with the commercial uses.

The following is an evaluation of the pedestrian facilities in the Tyson's Corner area based on the established set of criteria:

- level of use by pedestrians - fair; mid-day shopping and lunch trips and peak period transit trips provide the bulk of the pedestrian volumes.
- accessibility - good in areas where sidewalks are provided, but overall fair to poor.
- continuity of path longitudinally - poor; there are many gaps in the system.
- continuity of path laterally - fair; wide streets and high volumes at most crossing areas. At least there are medians at which pedestrians can take refuge.
- pedestrian delay - severe; little consideration in the traffic control system for pedestrians.
- level of pedestrian hazard - moderate; although there are few places to walk, the places the pedestrians choose to walk appear to be relatively safe.
- degree of conflict with vehicles - severe; high volumes make most crossings very uncomfortable.
- clarity of directional information for pedestrians - poor; lack of defined network causes problems.
- aesthetics and environmental quality - fair in the new areas, landscaping is quite nice, but for the most part Tysons is an unpleasant pedestrian experience.
- security - good; no real problems apparent.
- overall "friendliness" of the pedestrian environment - poor.

SUMMARY OF LESSONS LEARNED

Basically, the development of this area has been two phased: one period of time when regulatory controls were not often exercised and one when a greater amount of control was in evidence. The difference between the level of provision of pedestrian facilities in these two periods is remarkable. In the first phase virtually nothing was done. In the later phase the basic facilities are there, but the overall network planning leaves something to be desired. It proves again that, unless there is some inherent economic benefit or marketing advantage in providing special pedestrian facilities, the private sector will not usually spend the money. Although other case studies have indicated the willingness on the part of some developers to go to substantial effort and expense to create an attractive pedestrian environment, that attitude does not prevail here. Perhaps the pedestrian environment in Tysons is believed to be irrecoverable

and therefore little effort is made to improve it even in the newer developments. Some of the lessons that can be learned from the Tyson's Corner experience are:

- Efforts need to be made to foresee, insofar as possible, future development patterns and the demands they will make on pedestrian travel. Sidewalks are virtually always needed in commercial areas, and should be included even at initial development stages even though there are no pedestrian magnets at the time.
- A master plan of walkways should be prepared by local agencies before a suburban activity center develops too far.
- The need for mixing residential with commercial property should be remembered in planning and zoning decisions, and incentives for mixed-use development should be provided.
- The private sector should more seriously consider the use of structured parking to compress land uses and make the area more walkable. If it does not make economic sense up front, at least it should be factored into expansion plans. Public agencies should not overly restrict the densities of activity centers if pedestrian travel is to be fostered.
- Mechanisms should be in place to encourage land assembly so that larger planned developments can occur. These plans must be viewed from the pedestrian perspective at an early stage before the major site decisions are locked in.

For Tysons to recover from the development ills of the past, the public sector will need to make significant investment in providing sidewalk and landscaping. A special taxing district is a possible funding vehicle, but it is doubtful whether many developers would see its value at this stage. The traffic system is at capacity, and it is unlikely that significant infill development will occur for many years to come.

BELLEVUE, WASHINGTON - SUBURBAN ACTIVITY CENTER

SITE LOCATION AND BACKGROUND

The City of Bellevue, Washington is located just east of Seattle across Lake Washington. Developed in the 1950's as a suburb of Seattle, Bellevue was typical of developments of that period, heavily reliant on the automobile. Over the years, however, urbanization has moved over from Seattle to Bellevue, and a development boom in the CBD has taken place. It was apparent that because of the rising values of land downtown and the expected number of trips to be generated, Bellevue could no longer afford the luxury of being automobile oriented. Large building setbacks and acres of parking were no longer desirable or economically feasible. It was believed that some new guidelines had to be developed to regulate growth in the CBD.

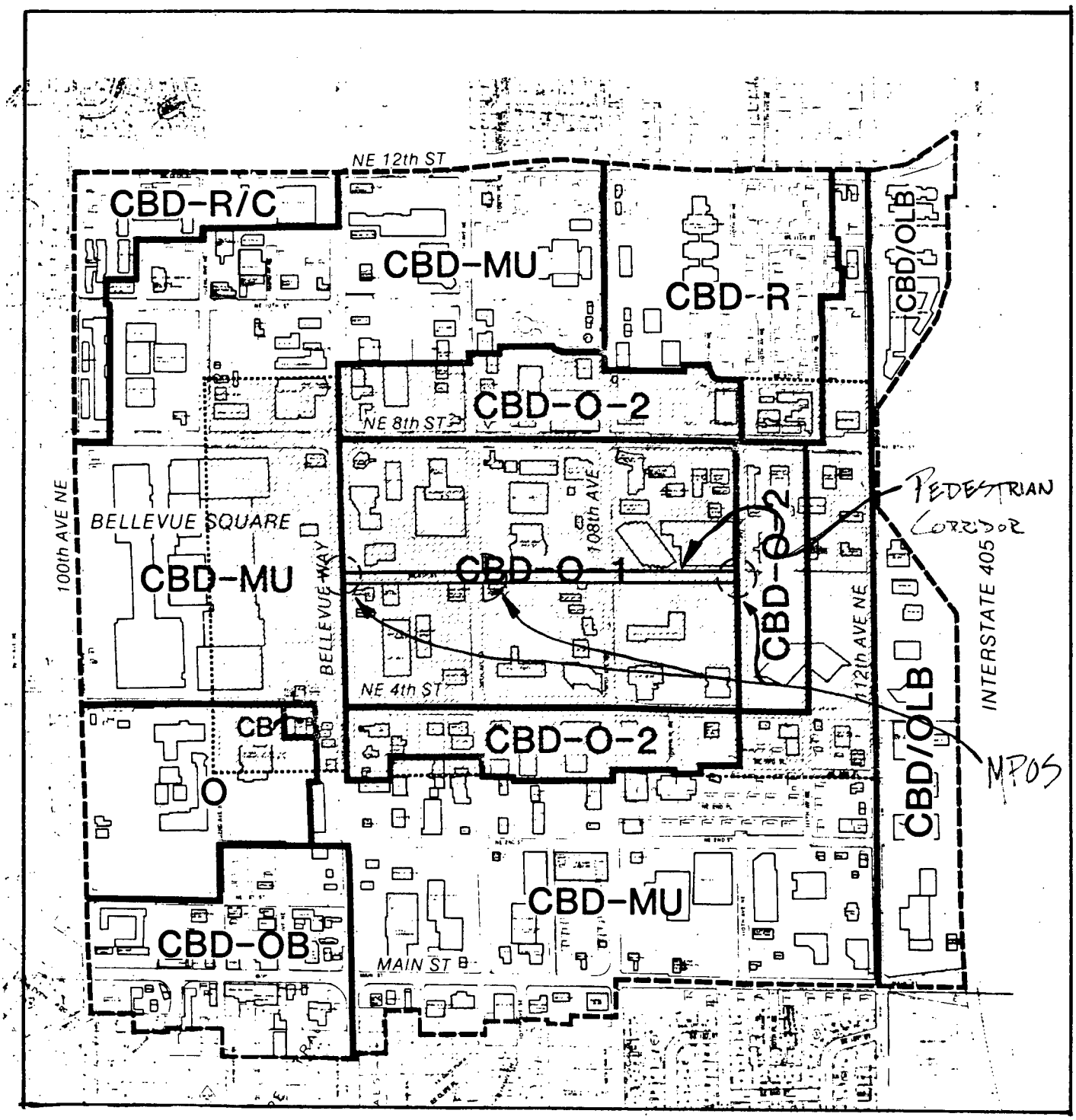
In 1981, the City Council adopted a new land use code that encouraged high density development, discouraged automobile use, and created within the CBD a pedestrian corridor and major public open spaces. While the plans for the downtown area have been completed, implementation of these plans will be an ongoing process.

DESCRIPTION OF THE PEDESTRIAN CORRIDOR AND MAJOR PUBLIC OPEN SPACES

Using an existing enclosed shopping mall as an anchor point, the Pedestrian Corridor will stretch for four blocks along NE 6th Street from Bellevue Way to 110th Avenue NE (see figure). Similar pedestrian design standards will be used for the extension of NE 6th Street to 112th Avenue NE, but this section of the street will also have automobile traffic. The section of NE 6th Street from 108th Avenue NE to 110th Avenue NE will serve as a transit mall.

Within the Pedestrian Corridor, three Major Public Open Spaces (MPOS) are planned. The MPOS are to serve as "focal points and gathering places within the CBD core." The MPOS will have "pedestrian friendly" restaurant and retail facilities, event areas, fountains, benches and planters. The MPOS will be located at Bellevue Way, 106th Avenue NE and 110th NE along the NE 6th Street corridor.

Special provisions have been made within the network so that the Pedestrian Corridor does not become a corridor only, but remains part of the overall network.



Bellevue Central Business District

Since some of the anticipated development will cover an entire block, pedestrian connections through these superblocks will be provided.

Both the Pedestrian Corridor and MPOS are part of the Bellevue CBD Subarea Plan. The plan regulates all development within the Bellevue CBD, but the primary focus is on the area called the Core Design District (CDD) (see figure). The CDD contains the Pedestrian Corridor and MPOS.

Another feature of the overall CBD network will be connections to the pedestrian network in the surrounding residential neighborhoods. Streets that run through the CBD and naturally extend into the adjacent neighborhoods, will be given special pedestrian treatments to serve as portals to the CBD.

IMPLEMENTATION AND FUNDING BACKGROUND

The Bellevue City Council took a major step to change the character of the CBD when it passed a new Land Use Code in 1981. The code forces intensive office and commercial development into the downtown area and sets non-negotiable limits on this type of development in other areas of the city. The intensity of development will be achieved through regulations allowing larger floor area ratio and requiring minimal setbacks. Increased pedestrian activity in the area will be fostered by elements of the code that set maximum parking space allowances and incentives for development of housing within the CBD. The development is patterned so that more intense development takes place in the CDD, while the most intense development takes place along the Pedestrian Corridor and MPOS.

Within the code there are two major elements that address pedestrian design. These are the Design Guidelines, Building/Sidewalk Relationships, and the Pedestrian Corridor and Major Public Open Space Design Guidelines. The first of these two documents covers the configuration and design of the overall network within the CBD and CDD. The second specifically covers the Pedestrian Corridor and MPOS. Both sets of guidelines offer a discussion of the purpose of the regulations; background information; and the issues, goals and objectives of the plans. The Building/Sidewalk Relationships guidelines are truly a set of design guidelines for the overall network. The Pedestrian Corridor and MPOS guidelines include a very specific set of design details besides a general design approach. One very interesting feature of the Pedestrian Corridor and MPOS guidelines is that they were created by architects and planners hired by the affected property owners. The development of the Pedestrian Corridor guidelines was funded by the Corridor Property Owners Committee and the Bellevue Downtown Association. The MPOS guidelines were funded by the abutting property owners at each of the open space sites. (Presently, only two of the three MPOS have had their Design Plans completed.) Excerpts of the Pedestrian Corridor and MPOS guidelines are included on the following pages.

Much of the cost of creating a new downtown for Bellevue will be borne by the private sector. Each new development or redevelopment project will be responsible for providing street front areas that comply with the Building/Sidewalk Relationships guidelines. Abutting land owners will fund the construction of the approved MPOS. The Bellevue city government will be making a fairly heavy investment in the area as well. The City will be responsible for many of the street level improvements. Their biggest costs will be for land acquisition for street and sidewalk widenings. They will also be making improvements to the traffic control system. The overall cost of these improvements will be borne by the land owners using a two-thirds private, one-third public split. The private funds will come from a special assessment scheme.

EVALUATION OF FACILITIES

It is difficult to evaluate the pedestrian facilities in the Bellevue CBD. There is no legal mandate that puts the planning on a fixed time schedule. When a parcel of land is developed or redeveloped, then the improvements for that site are made. Therefore, market forces for office and retail space are what drives the schedule. The Pedestrian Corridor is approximately 15 percent complete, work has begun on one of the MPOS, and as already mentioned, work on the rest of the network is ongoing.

The following is an evaluation of the Bellevue pedestrian facilities examining the network as it stands and how it will be:

- level of use - good; annual increases in pedestrian activity have been noted.
- accessibility - fair; older sidewalk areas are too narrow.
- continuity of path longitudinally - good; sidewalks are provided throughout the area.
- continuation of path laterally - fair; although there are pedestrian signals, it is not visually friendly having wide streets with higher speeds.
- pedestrian delay - moderate; currently the network is still heavily automobile oriented; this causes signals to allot most of the cycle times to cars.

I.
INTRODUCTION & PURPOSE

Pedestrian amenities are a major focus of the Land Use Code adopted in 1981 to guide the growth and development of Bellevue's Central Business District. A network of public spaces is provided by the Code to tie together intense new development and to ensure a high quality pedestrian environment. In addition to improvements to existing sidewalks, several new types of features are called for: A Major Pedestrian Corridor, Major Public Open Spaces, and mid-block pedestrian connections.

The Pedestrian Corridor is to be a pedestrian street extending from the Bellevue Square regional shopping center to 110th Avenue NE, following the alignment of NE 6th Street. Major Public Open Spaces are to be located at the mid-point of the Pedestrian Corridor at 106th Avenue NE and at each end at Bellevue Way NE and 110th Avenue NE. Pedestrian connections through development abutting the Corridor are to provide for pedestrian circulation through each block. The easterly third of the Pedestrian Corridor will wrap around a transit center for buses.

The Land Use Code requires the property owners abutting the Pedestrian Corridor and Major Public Open Spaces to prepare design guidelines for these features. This document contains the design guidelines for the Major Pedestrian Corridor prepared for the property owners by TRA and Don Miles Associates/PPS, and for the Major Public Open Spaces prepared by Don Miles Associates/PPS. The design guidelines for the Major Public Open Space at 110th Avenue NE will be prepared in the future and are not included in this document. These guidelines have been reviewed and approved by the Pedestrian Corridor Committee, City staff, and Planning Commission, and have been adopted by the City Council by resolution.

These guidelines will serve three groups of people. First, the Planning Department will use these guidelines as a part of the review of proposed projects in the CBD. Second, the guidelines should assist developers and their architects and landscape architects in the design of projects by providing explicit criteria. Finally, these guidelines will benefit the public by ensuring a premier quality downtown walking environment.

Applicants should consult all portions of the Land Use Code, particularly 20.25A, to identify other applicable requirements.

Excepts from Pedestrian Corridor and Major Public Open Space Design Guidelines (next three pages)

II.
PEDESTRIAN CORRIDOR DESIGN GUIDELINES

BACKGROUND

Bellevue was originally planned in the 1950s to provide convenient, efficient automobile access and adequate space for parking and auto-oriented land uses. As Bellevue has grown, demands on available land have increased land values and vehicular congestion. With increased density and urbanization, policies have been adopted to encourage pedestrian and transit trips.

In 1981 the City Council of the City of Bellevue passed an ordinance increasing allowable density in the CBD and requiring the creation of a pedestrian corridor linking the Bellevue Square regional shopping center with highrise office and mixed use development to the east. The Pedestrian Corridor is located in the alignment of NE 6th Street. The Corridor is predominantly on private land and will be privately designed, developed, and maintained. Transit service will be improved by the creation of a transit center near the Pedestrian Corridor.

In April 1981 TRA and Don Miles Associates/PPS, architects and planners, were hired by the Corridor property owners committee in cooperation with the Bellevue Downtown Association to develop Corridor design guidelines and concepts for interim Corridor development. These guidelines were developed together with a committee consisting of the property owners and developers, and City staff.

These guidelines were adopted by the Bellevue City Council after a public hearing and embodied in Resolution No. 3946, December 14, 1981. The guidelines provide property owners, developers, architects, and the City with a framework to insure a successful pedestrian related development and phased completion.

OBJECTIVES

The objectives of the Corridor as defined by the Committee are as follows:

Provide a safe, comfortable, lively, and attractive place for pedestrians.

Achieve an identity and an image as a special place.

Allow for modification and expansion over time as surrounding conditions change.

Accommodate access to other major public facilities such as transit center, civic/convention center, and other public spaces.

Reflect the qualities of a truly "urban" environment with its intensity, sophistication, and diversity.

Reinforce and stimulate high quality future adjacent development.

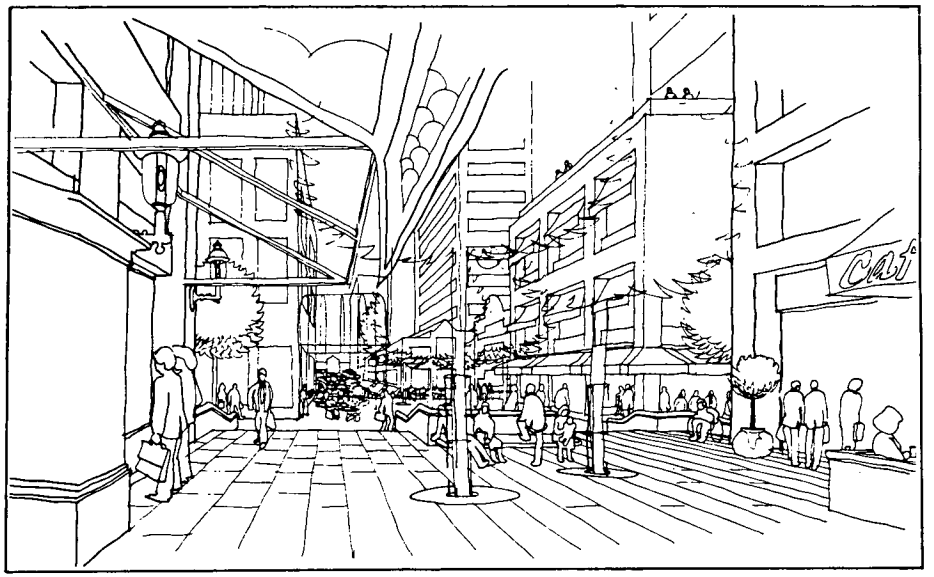
Reflect characteristics of this locale: climate, vegetation, and topography.

Encourage evening and weekend use, as well as weekday use.

Provide a new focal point for downtown Bellevue.

IDENTIFICATION

The Council and property owners should select an appropriate name and symbol for the Corridor.



Illustrative design concept for the Pedestrian Corridor, viewing west to Bellevue Square from 108th Avenue NE.

- level of pedestrian hazard - low; no real accident problems.
- degree of conflict with vehicles - moderate; a great number of conflict points still exist within the existing grid system; however, implementation of future plans should eliminate many of these conflicts.
- clarity of directional information for pedestrians - fair, now; excellent later; the existing network lacks directional clarity, but the streetscape treatments to be implemented should solve their problem.
- directness of pedestrian path - good; as new development comes on line, large parcels (superblocks) of land will be covered, but provisions have been made to allow for pedestrian midblock crossings through the structures.
- clarity of information for drivers - good; streetscape change from areas outside CBD should alert drivers.
- aesthetics and environmental quality - excellent; the design guidelines and details speak for themselves.
- security - good; conscious effort has been made to design a secure system; time will tell.
- overall "friendliness" of pedestrian environment - excellent; the area should become a showplace of good pedestrian design.

SUMMARY OF LESSONS LEARNED

With the implementation of the design far from complete, it is hard to make a solid judgement about what can be learned. However, from Bellevue's past experience much can be learned. If pedestrians are to be taken into account in the design process, it must be mandated in the planning ordinances. If a jurisdiction relies totally on the private sector to take the initiative to provide for the pedestrian, no provisions will be made. Continued automobile dependence can cause major accessibility problems as the development density increases. The combination of no pedestrian requirements and automobile dependence will result in no pedestrian facilities.

From the new Bellevue, one can see that the development process is not cast in stone, and past patterns can be changed by a change in emphasis toward pedestrianism, backed by appropriate changes in regulation.

WARNER CENTER, WOODLAND HILLS, CALIFORNIA

SITE TYPE AND LOCATION

The Warner Center began development in the early 1970's as a high density mixed-use development. The Center presently consists of a shopping mall, several mid-rise and high-rise office structures, scattered commercial establishments and a residential complex. Several more office buildings are under construction. The approximate size of the commercial/industrial portion of Warner Center is slightly more than 11 million gross square feet of floor area. The aerial photograph on the following page shows the density of Warner Center.

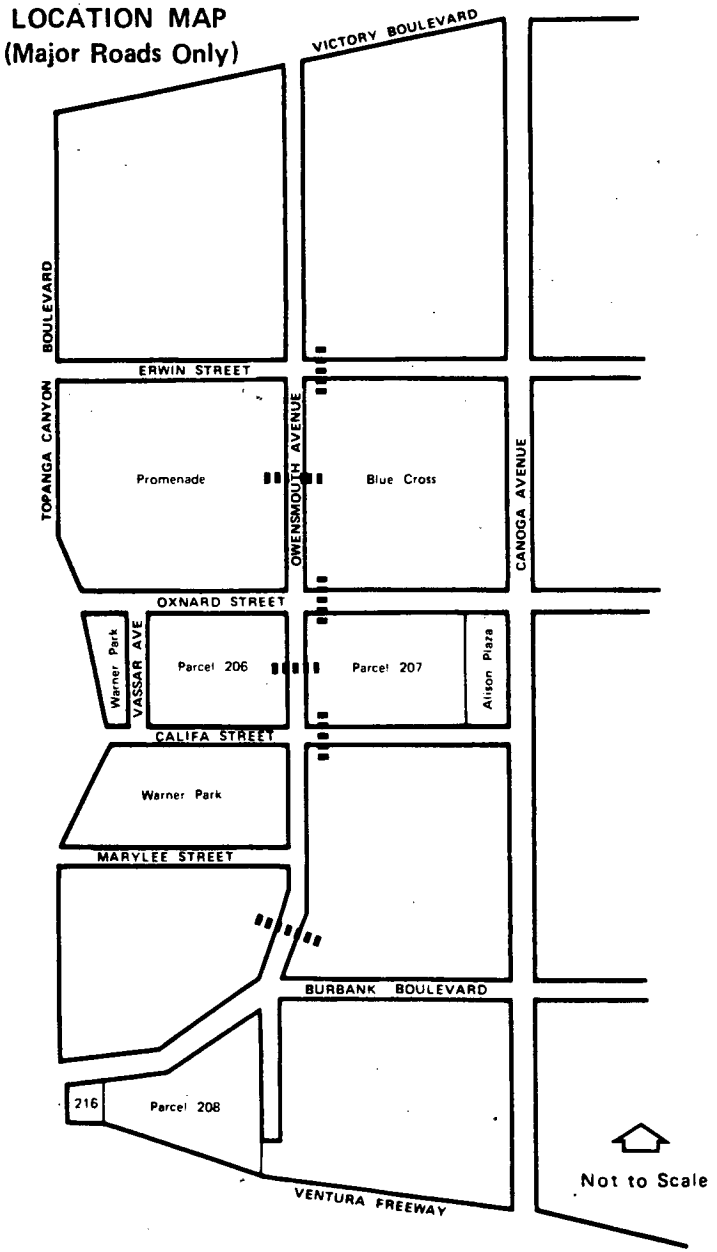
Located in suburban Los Angeles, the 760 acre Warner Center complex was developed on one of the few remaining ranches in the San Fernando Valley. Surrounded by the affluent communities of Woodland Hills, Winnetka and Canoga Park, 600 acres of the Warner Ranch succumbed to development pressure. Land use in the area around the Warner Center development was is single family residential with scattered commercial and industrial uses.

DESCRIPTION OF STREET SYSTEM AND PEDESTRIAN FACILITIES

The Ventura Freeway (Route 101) and four major arterial streets provide access to the Warner Center (see figure). The complex is bounded by Topanga Canyon Boulevard on the west, the Ventura Freeway on the south, DeSoto Avenue on the east and Vanowen Street on the north. Several two and four-lane streets pass through the Warner Center development.

A general intent of the planning of Warner Center is to minimize conflict between pedestrians and automobiles as well as to preserve and enhance the appearance of the area. Consequently, projects within the Center must provide pedestrian improvements. The following photographs depict examples of pedestrian improvements designed to encourage walking in the Warner Center. Meandering sidewalks, street trees, sidewalk lighting and brick benches are typically provided alongside the development.

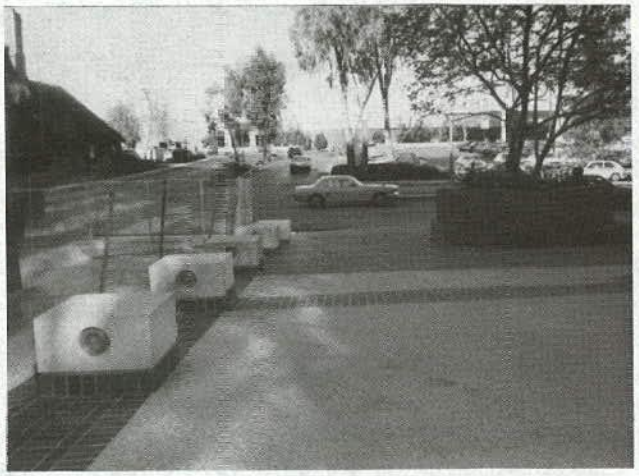
Developments of higher density (a FAR of at least 1.3) are required to provide more elaborate types of pedestrian facilities. Buildings located within 65 feet of the street are required to provide elevated pedestrian accessways (see photographs).



▮▮▮▮ Approximate location of future pedestrian overpasses designated on specific plan.

Warner Center Plan of Pedestrian Crossings

Aerial View of Warner Center



Typical improvements provided by developers

Meandering Walkways

These accessways connect entrances between adjacent buildings. Similarly, all pedestrian entrances located within the Warner Center Development must be at least 18 feet above street grade in order to connect with the elevated accessways. Pedestrian bridges designed to connect buildings between street blocks have also been included in the Warner Center development plan. Finally, a people mover would be considered by the City Council once development in the Warner Center reaches a FAR of 3.0.

IMPLEMENTATION AND FUNDING BACKGROUND

Through the implementation of the General Plan, the Los Angeles Planning Department has been able to secure various pedestrian improvements at Warner Center. Specifically, the Centers Concept of the Los Angeles General Plan requires that all high density, mixed-use use development include improvements to pedestrian facilities. This has been achieved in the Warner Center through a device known as the Specific Plan. Approved in 1971, the Specific Plan is an ordinance which includes a set of policies, standards, and regulations which provide controls and incentives for the achievement of the General Plan. Regulations are set forth in addition to those in the planning and zoning provisions of the municipal code of the City of Los Angeles.

The Warner Center Specific Plan, the first specific plan to be developed by the City of Los Angeles, requires all development within the Warner Center with a FAR of 1.3 to provide a series of pedestrian amenities. The amount and type of pedestrian improvements are proportional to the density associated with each development. Lower densities, i.e., less than .33 FAR, require the provision of elevated pedestrian entrances. Pedestrian bridges are required at higher densities and, finally, a people mover, moving sidewalk or some other system for facilitating pedestrian movement is required once the development attains a FAR of 3.0.

A copy of the Warner Center Specific Plan is included at the end of this case study.

EVALUATION OF FACILITIES

A general intent of the Warner Center Specific Plan is to minimize conflicts between pedestrians and traffic. Several projects are proposed to meet this goal. To date, however, only one on-site elevated pedestrian accessway has been completed and a second one is under construction. Additional pedestrian accessways and bridges will be initiated once the appropriate densities are triggered. The first pedestrian bridge across a street is due to begin construction in the near future. The bridge will cross Oxnard Street and connect an office development with the shopping mall. Four pedestrian bridges over arterials are proposed for the Warner Center.

Several smaller scale improvements, including meandering walkways, brick benches, street trees, and sidewalk lights are already in place. These improvements create a pleasant environment for walking. Interviews around Warner Center indicate that pedestrians particularly enjoy the scenery and aesthetics of the area.

Yet, with all the physical design improvements, planners seem to have overlooked the fact that pedestrians are having difficulty crossing streets in the Warner Center complex. As mentioned, several of the streets running through the complex are four or more lanes. Many of these do not have signals or stop signs at points heavily traveled by pedestrians. The single most common complaint of pedestrians is difficulty crossing streets. Most survey respondents indicated a need for more traffic signals or stop signs at intersections.

Developer reaction to the provision of pedestrian accessways and bridges has been mixed. How to best handle pedestrian and vehicular conflict remains an area of dispute between developers and the City. Developers do not object to the provision of sidewalk and streetscape improvements, as they recognize a pleasant environment is in their own best interests. There has been much disagreement over the effectiveness of bridges and accessways, however. Critics of these pedestrian facilities feel that the removal of pedestrians from the streets leads to a sterile environment. They state there is no "walking ambience" 18 feet above the street level. Shopkeepers are also concerned that they will lose business because fewer people will be window shopping. Another argument is that the nodes of activity are too far apart i.e., the shopping mall and office development, which discourages rather than encourages walking.

The following is a summary evaluation of the Warner Center pedestrian facilities based on the defined set of criteria:

- level of use by pedestrians - fairly well utilized; this depends, however, on how close each office development is to the shopping mall and/or restaurants. Some office development is too remote.
- continuity of path longitudinally - excellent; the sidewalk system is extensive.
- continuity of path laterally - fair; crossing streets is difficult at times depending on the amount of traffic. Streets are wide and only a few have medians.
- accessibility - good; pedestrians have no difficulty accessing the site.
- pedestrian delay - low; many intersections are unsignalized or unsigned, thus pedestrian delay depends on the amount of traffic on the street. Typically, when pedestrians step off a curb in a crosswalk vehicles will slow or stop.
- level of pedestrian hazard - moderate; most pedestrians assume that traffic will stop once they enter a crosswalk. Many pedestrians are too trusting and do not exercise the proper degree of caution.
- degree of conflict with vehicles - severe; traffic volumes are heavy at peak pedestrian times i.e., noon and 5:00 PM. Crossing at unsignalized and unsigned intersections is difficult at these times.
- clarity of directional information for pedestrians - poor; there is little or no signing. Proper signing could be used to direct pedestrians to the best location to cross streets.
- directness of pedestrian path - good; paths are direct but distance between developments is sometimes great.
- aesthetics and environmental quality - excellent; the area projects a park-like atmosphere with well landscaped sidewalks and abundant open space.
- security - good; pedestrians interviewed felt safe walking in the area.
- overall "friendliness" of the pedestrian environment - good; the amount of greenery and the elaborate sidewalk network creates an enjoyable walking atmosphere.

SUMMARY OF LESSONS LEARNED

The Los Angeles Planning Department, through the preparation of the Warner Center Specific Plan, has tied pedestrian amenities to increasing densities. Logically, as density increases so does the need to provide pedestrian systems which separate pedestrians from vehicles. Both the City and the developer recognize the impact pedestrians can have on traffic flow in high density areas.

The City has been able to secure these pedestrian amenities without providing any bonus to the developer. This is more possible in areas where development potential is already high.

Several lessons from Warner Center are as follows:

- Pedestrian grade separations are not necessarily perceived as improving the pedestrian environment. Climbing stairs or ramps is a significant barrier to pedestrian accessibility. Providing tunnels with gradually sloping approaches is a preferred design option, if they can be kept secure.
- Ways need to be found to bring land uses physically closer together to reduce walking distances. This requires either higher density mixed use on a single parcel or a rearrangement of buildings on adjacent sites. Parking and access needs often dictate building arrangements.
- If a development is truly to be pedestrian sensitive, the pedestrian must be given greater right-of-way advantage, through signalization or regulatory signing. Although the west has a better reputation for yielding to the pedestrian than other parts of the country, providing a crosswalk no longer is a significant advantage to pedestrian crossings.

SPECIFIC PLAN

WARNER CENTER

ORDINANCE NO. 142,281
WARNER CENTER SPECIFIC PLAN ORDINANCE

An Ordinance establishing a Specific Plan for a portion of the Warner Ranch.

WHEREAS, the owner of the property described upon the map set forth in Section 2 of this ordinance has requested extensive and intensive rezoning thereof to permit development in conformity with the previously adopted General Plan for such area, and

WHEREAS, in order to assure that such development proceeds in compliance with such General Plan it is necessary to adopt the following Specific Plan for such area, and

WHEREAS, the Council finds and declares that it would not approve the requested and pending rezoning for such area unless the following Specific Plan was first adopted and effective, and

WHEREAS, the property owner has solicited the enactment of and expressed his willingness to comply with this Specific Plan and has requested the rezoning dependent thereon,

NOW THEREFORE
THE PEOPLE OF THE CITY OF LOS ANGELES
DO ORDAIN AS FOLLOWS:

SECTION 1. DEFINITIONS

Whenever the following terms are used in this Ordinance with the first letter or letters capitalized, they shall have the meaning specified below unless the context clearly indicates to the contrary.

A. "Block" shall mean a parcel of land, whether under one or several ownerships, shown on the map contained in Section 2 as within the Specific Plan Area and as bounded by streets or by streets and the boundary of such Specific Plan Area.

B. "Core Area" shall mean that portion of the Specific Plan Area which lies within the dashed lines on the map contained in Section 2.

C. "Floor Area Ratio" shall mean the total square footage of building floor area, exclusive of parking space, stairs, mechanical shafts and mechanical rooms, of all buildings located within a given area as compared to the total square footage of such given area, exclusive of streets.

D. "The Plan" shall mean the General Plan of the City of Los Angeles and any applicable portions thereof.

E. "Major Project" shall mean, with respect to land zoned for commercial uses, any building which contains four stories or more above the highest grade of the adjacent street or streets or which is required by the Municipal Code of the City of Los Angeles to provide 200 or more parking spaces and, with respect to land zoned residential, any building which contains six stories or more above the highest grade of the adjacent street or streets, as the case may be.

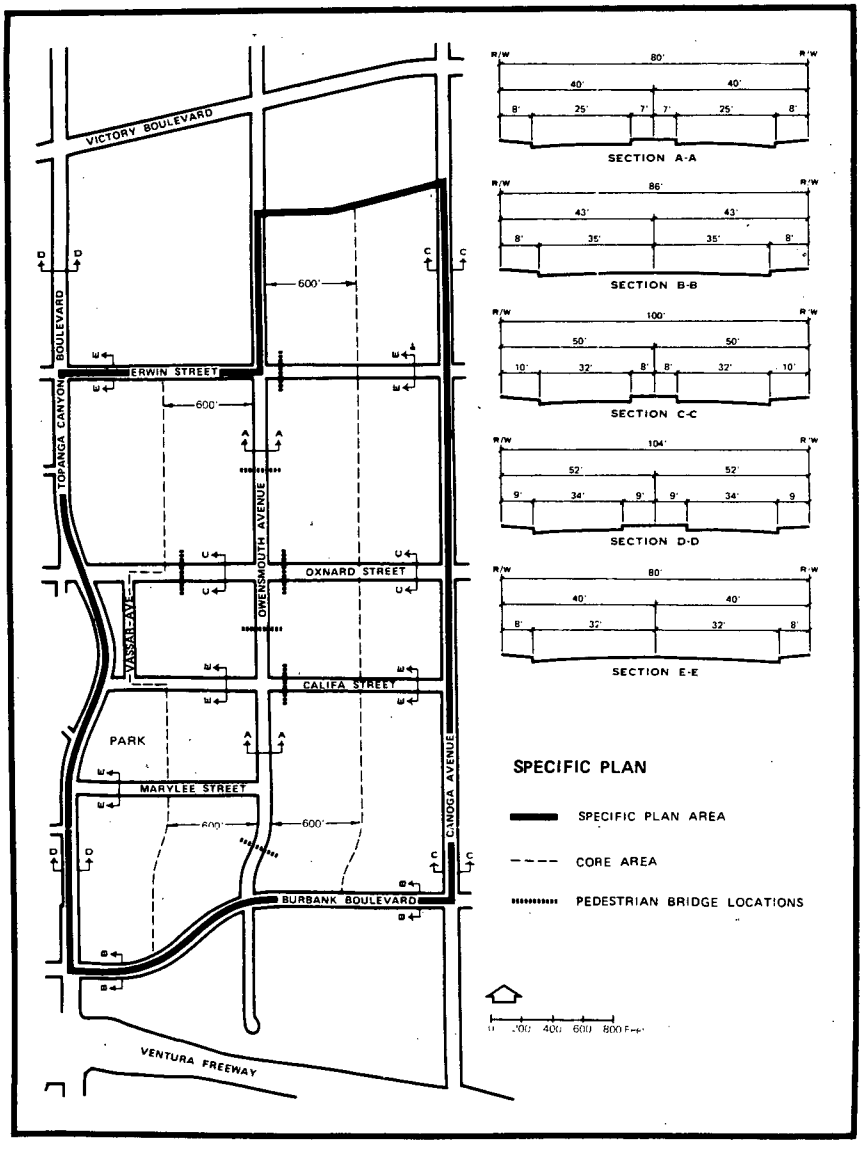
F. "Specific Plan Area" shall mean that area shown within the heavy lines on the map contained in Section 2.

G. "Off-site Advertising" shall mean a sign or billboard that directs attention to a business, profession, product, commodity, or service that is not one of the primary businesses, professions, products, commodities, or services sold, manufactured, conducted, or offered in a store or shop or office in the building on which the sign is located.

Section 2. [Establishment of Specific Plan]

The Council hereby establishes this Specific Plan applicable to that area of the City of Los Angeles Shown upon the below map within the heavy lines thereon:

This Specific Plan is intended to provide regulatory controls and incentives for the systematic execution of that portion of the



WARNER RANCH / AN URBAN CENTER

The Warner Center Specific Plan Ordinance

Plan which includes said area and to provide for public needs, convenience and general welfare as the development of such area necessitates. The regulations of this Specific Plan are in addition to those set forth in the planning and zoning provisions of Chapter 1 of the Municipal Code of the City of Los Angeles and do not convey any rights not otherwise granted under the provisions and procedures contained in said chapter, except as specifically provided for herein. This Specific Plan shall be applicable only to those areas where the zoning permits the land uses provided for in the Plan.

Section 3. [Street Dedication]

The streets within and adjoining the Specific Plan Area shall be dedicated and improved in accordance with the standards set forth upon the map shown in Section 2 hereof and pursuant to the usual subdivision procedures.

Section 4. [Pedestrian Entrances]

Any Major Project constructed wholly or partially within the Core Area shall include provisions for a pedestrian entrance, no portion of which entrance shall be at an elevation of less than 18 feet above the grade of the street on which such Major Project fronts, unless a lower elevation is approved by the Director of Planning and the City Engineer as sufficient to connect satisfactorily such pedestrian entrance with the pedestrian accessways required by Section 6.

Section 5. [Ground-level Access]

Any building containing 2,000 square feet or more which is constructed on land zoned for commercial uses and which is not subject to the requirements of Section 6 shall include, as a part of such building or incidental thereto, ground-level, hard-surface walkways having an unobstructed width of 12 feet, or any different width proposed by the owner and approved by the City Engineer as adequate to satisfactorily carry anticipated pedestrian traffic, which walkways shall connect together the following:

(1) an entrance to the building;

(2) an entrance to any adjacent building on the same parcel; and

(3) the property lines of the parcels adjoining the parcel on which such building is being constructed where such lines join the street or streets upon which such parcel fronts or points along such property lines when approved by the Director of Planning and the City Engineer after consultation with the owners of such adjoining parcels and after determining that such will more readily facilitate the movement of pedestrian traffic in such area.

Such walkways shall be made available during the existence of the buildings to be served for the use of the public as walkways (reserving, however, to the property owner the right to construct, erect, establish and/or maintain thereon such structures, forms, exhibits and/or displays which will not interfere with the use thereof by the public as set forth herein) pursuant to Section 813 of the Civil Code of the State of California, or under any other enactment having substantially similar provisions, and the permitted use by the public shall not be revoked without the prior written approval of the City Engineer after first ascertaining that the removal of the buildings to be served has been completed or that an appropriate alternative to such walkways is assured. Such walkways may be wholly or partly in lieu of customary dedicated sidewalks if it is determined by the Advisory Agency (where the processing of a subdivision is involved) after consultation with the City Engineer or otherwise by the City Engineer (where the processing of a subdivision is not involved) that such walkways will provide ease of pedestrian flow at least equal to that provided by the usual sidewalks.

Section 6. [Elevated Accessways]

(a) Any Major Project constructed wholly or partly within the Core Area and within 65 feet of the street on which such Major Project fronts shall include pedestrian accessways having a width of 12 feet, or any different width proposed by the owner and approved by the City Engineer as adequate to carry the ultimately anticipated pedestrian traffic, at an elevation of not less than 18 feet above the grade of such street, or at such lower elevation or elevations approved by the Director of Planning and the City Engineer as providing adequate clearance and as consistent with the basic concept of the overall development, which accessways shall connect together the following:

(1) the pedestrian entrance to the Major Project required by Section 4;

(2) such pedestrian entrance to any other Major Projects on the same parcel;

(3) the property lines of the parcels within the Core Area which adjoin the parcel on which such Major Project is to be constructed, where such lines join the street or streets upon which such parcels front, or points along such property lines when approved by the Director of Planning and the City Engineer after consultation with the owners of such adjoining parcels and after determining that such will more readily facilitate the movement of pedestrian traffic in such area; and

(4) any pedestrian bridge location designated on the map contained in Section 2 which intersects the property line of the parcel on which such Major Project is to be constructed.

Where such Major Project is to be constructed upon more than one parcel, the points described in paragraph (3) of this subsection (a) of Section 6 shall be the property lines of the parcels within the Core Area which adjoin the parcels upon which such Major Project is to be constructed.

In addition, pedestrian access shall be provided from the elevation and point described in paragraph (4) of this subsection (a) of Section 6 to the sidewalk in the street for which such bridge is designated. Such accessways and access shall be made available during the existence of the buildings (reserving, however, to the property owner the right to construct, erect, establish and/or maintain thereon such structures, forms, exhibits and/or displays which will not interfere with the use thereof by the public as set forth herein) to be served for the use of the public as pedestrian accessways under Section 813 of the Civil Code of the State of California, or under any other enactment having substantially similar provisions, and the permitted use by the public shall not be revoked without the prior written approval of the City Engineer after first ascertaining that the removal of the buildings to be served has been completed or that an appropriate alternative to such accessways and access is assured.

(b) When the land within the Core Area of any Block zoned for commercial uses attains a Floor Area Ratio of one and three-tenths (1.3), then the pedestrian accessways and access thereto described in subsection (a) of this Section 6 shall be constructed in conjunction with each of the Major Projects within the Core Area not having such accessways and access thereto the Building and Safety Department thenceforth shall not issue any building permit for the construction or enlargement of any buildings within the Core Area of such Block until such time as such construction takes place or is assured by the organization hereinafter required or otherwise in a form and manner satisfactory to the City Engineer.

(c) In any Block zoned for commercial uses any Major Project constructed therein after the Core Area of such Block has attained a Floor Area Ratio of one and three-tenths (1.3) shall include the pedestrian accessways and access described in subsection (a) of this Section 6.

(d) In any Block zoned residential any Major Project constructed or enlarged after such Block has attained an average density equal to or exceeding 30 residential units per acre, exclusive of streets, shall include the pedestrian accessways and access described in subsection (a) of this Section 6.

Section 7. [Pedestrian Bridge]

When two Blocks which are proposed to be connected by any pedestrian bridge designated on the map contained in Section 2 have attained:

(a) a Floor Area Ratio of one and three-tenths (1.3) in the respective Core Areas of such Blocks, if both such Blocks are zoned for commercial uses, or

(b) an average density in each such Block equal to or exceeding 30 residential units per acre, if both such Blocks are zoned residential, or

(c) such Floor Area Ratio and such average density, respectively, if one such Block is zoned for commercial uses and the other such Block is zoned residential, then there shall be constructed a pedestrian bridge at the location designated on such map, which bridge shall be 12 feet in width, or any different width proposed by the owner or owners concerned and approved by the City Engineer as adequate to carry the ultimately anticipated pedestrian traffic, and shall have a vertical clearance of 17 feet from any portion of the roadway adjacent thereto, or any different clearance proposed by the owner or owners concerned and approved by the City Engineer as providing adequate clearance, and the Building and Safety Department shall not issue any building permit for the construction of any new building or the enlargement of any existing building within either of such Blocks until the construction and maintenance of said pedestrian bridge is assured, whether by the organization hereinafter required or otherwise, in a form and manner satisfactory to the City Engineer.

Section 8. [Pedestrian Mover]

When development within the entire Specific Plan Area attains a Floor Area Ratio equal to three (3.0), the Building and Safety Department shall notify the City Council thereof and thereafter shall not issue any building permit for the construction or enlargement of any building within the Specific Plan Area until the Council shall have initiated or declared its intention not to initiate proceedings under Division 7 of the Street and Highways Code of the State of California, or under any other enactment permitting the construction of improvements and the imposition of assessments to pay the cost thereof for the construction of systems for the more expeditious movement of pedestrians in a form and manner and in locations satisfactory to the City Engineer.

Such systems shall be so arranged as to provide access to them from the pedestrian bridges crossing Owensmouth Avenue and Oxnard Street.

Section 9. [Signs and Billboards; Screening]

(a) Signs and billboards containing Off-site Advertising other than temporary directional signs shall not be erected or maintained within the Specific Plan Area.

(b) No sign or structure supporting a sign shall be erected or maintained on the roof of any building located in the Specific Plan Area. This requirement does not prohibit signs attached to a building which do not project above the roof eaves or parapet wall (whichever is higher) of such building.

(c) All roof-mounted mechanical equipment and/or ductwork on any building located in the Specific Plan Area which projects more than 1-1/2 feet above the roof eaves or parapet wall (whichever is higher) of such building shall be screened.

Section 10. [Owner Acknowledgment of Limitations]

The Department of Building and Safety shall issue no building permit for construction upon any of the property set forth upon the map contained in Section 2 hereof as being within the Specific Plan Area until such time as the owner or owners of all such property have declared in writing, in a form designed to run with the land and satisfactory to the City Attorney, and have recorded an acknowledgment of the contents and limitations of this Specific Plan and specifically including the fact that the right to revoke the consent to public uses of certain improvements pursuant to Civil Code Section 813 has been restricted and that under some circumstances building permits will not be issued with respect to certain property as a result of the prior development of other adjoining or nearby property within the Specific Plan Area until certain required improvements are assured and that under circumstances the certificate of occupancy for structures upon certain parcels may be revoked, and have consented thereto and agreed to comply therewith.

Section 11. [City's Right of Waiver]

The City Council may waive, eliminate, or modify any of the requirements contained in this Specific Plan with respect to a particular parcel or structure if it determines, after first considering reports and recommendations by the Board of Public Works and the City Planning Commission, that the proposed development for such parcel or structure substantially complies with and carries out the spirit and intent of such requirements.

Section 12. [Right of Appeal]

Any decision or determination by the Director of Planning and/or the City Engineer made pursuant to the authority granted in Sections 4, 5, 6, 7 and 8 of this Specific Plan, or any failure to act within a period of 60 days after a request in writing has been made by any person described below, shall be appealable to the City Planning Commission and/or the Board of Public Works, as the case may be. Such right of appeal shall extend only to the owners of property subject to this Specific Plan who are aggrieved by such decision, determination or failure to act.

Section 13. [Required Organization]

If the improvements and their maintenance required in Section 6(b) and Section 7 incident to the further issuance of building permits are not promptly constructed at the time indicated therein in a manner satisfactory to the City Engineer, or if any of the improvements required by Sections 6 or 7 hereof are not maintained in a manner satisfactory to the City Engineer, then a corporation, association, property owners group or similar entity shall be formed with the right to assess the parcels for the benefit of which such improvements are required, to meet the expenses of such entity, and with the authority and the duty to construct and maintain such improvements. Such entity or entities shall operate under recorded conditions, covenants and restrictions approved as to form by the City Attorney which shall include compulsory membership of owners of parcels affected, and flexibility of assessments to meet changing costs of construction, maintenance, repairs and services. This condition shall not apply to land dedicated to the City for other public purposes. Further, if the improvements required by Section 6 are not maintained in a manner satisfactory to the City Engineer after he has given written notice thereof, by mail or personal service, to the owner of the parcel whereupon such improvement is not being properly maintained, then upon notice from the City Engineer the Department of Building and Safety shall issue no further permits for the construction or enlargement of a structure upon such parcel and shall revoke any and all certificates of occupancy for Major Projects upon such parcel.

Section 14. [Expansion of Specific Plan Area]

It is declared to be the intention of this Council to expand the Core Area and/or Specific Plan Area to include additional lands as adjacent areas develop with intensive uses justifying the regulations herein set forth.

MONTROSE SHOPPING PARK (HONOLULU AVENUE) AND BRAND BOULEVARD GLENDALE, CALIFORNIA

SITE TYPE AND LOCATION

The City of Glendale is located in the northern portion of Los Angeles County between the cities of Pasadena and Burbank (see figure). With its quick and easy access to the San Fernando Valley and downtown Los Angeles, Glendale became a popular place to reside in the early 1950's. Most of Glendale was developed by the 1940's and now much of it is undergoing redevelopment or revitalization. The Montrose Shopping Park, located along Honolulu Avenue and Brand Boulevard are retail streets which have been retrofitted to better accommodate the pedestrian.

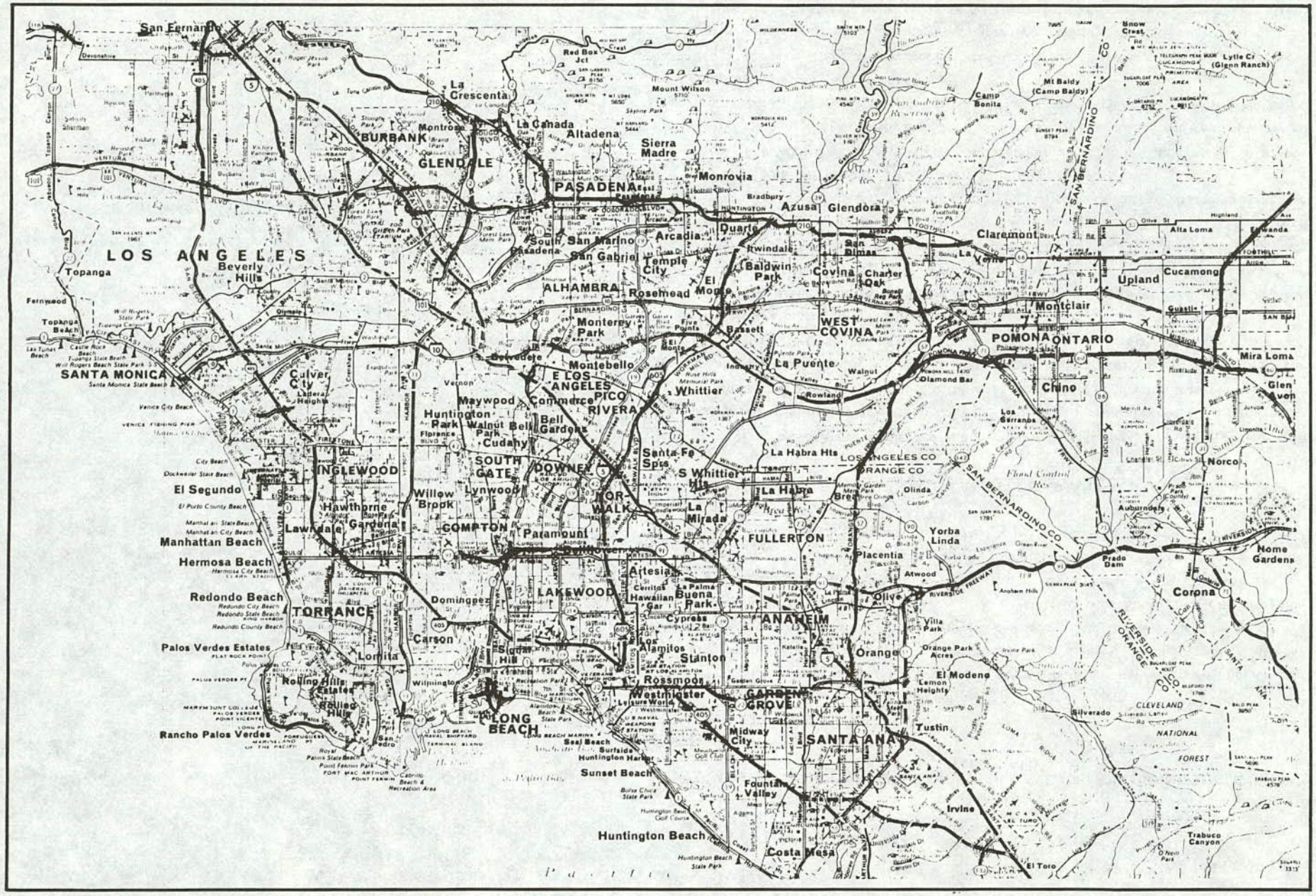
DESCRIPTION OF STREET SYSTEM AND PEDESTRIAN FACILITIES

Access to Brand Boulevard and the Montrose Shopping Park is provided by a series of freeways running throughout the area. The Foothill Freeway and the Ventura Freeway run east/west and border the sites on the north and south, respectively. The Glendale freeway runs north/south and lies one mile to the east of both sites. The major arterials in the vicinity are: Foothill Boulevard, Glen Oaks Boulevard and Canada/Verdugo Boulevard.

The Brand Boulevard retrofitting effort has been underway since the 1970's. The first phase of the project was completed in 1978 and extends five blocks from Colorado Avenue to Lexington. The second phase of improvements is currently underway and extends from Lexington northward to Glen Oaks Boulevard. This portion of the project covers a three block area. The construction cost of phase one and phase two are $3.8 million and approximately $5 million, respectively.

The Montrose Shopping Park revitalization project has also taken place in phases; the first phase began in the late 1970's. Landscaping is still in progress but for the most part, the project is complete. The shopping park extends two blocks or approximately ½ mile.

These revitalization projects have maintained vehicular access, yet produced a town center atmosphere geared predominantly to the pedestrian. Measures have been taken on both streets to improve pedestrian safety and to make crossing the street



Location of Glendale (note Montrose to the north)

more convenient (see the following photographs). Street widths have been reduced, and in the case of Honolulu Avenue, the street now has subtle curves. Both of these factors result in a slowing of traffic. Although Brand Boulevard's width has been reduced, it is still a wide street and crossing is oftentimes difficult. A median has been constructed with curb cuts and brick walkways along either side. Mature trees, which serve as barriers from on-coming traffic, have also been planted along the median. Crosswalks have been repaved with materials that clearly differentiate them from the adjoining street. Several traffic signals have been installed to slow traffic and allow for greater crossing ease. Both streets have an increased sense of pedestrian/vehicular separation through the placement of either mature trees or two-foot concrete barriers along the edge of the street. Street design improvements for both areas include: sidewalks reconstructed in brick; landscaping including mature street trees, shrubs and flowers; wrought iron grates around trees; benches; and street lights.

IMPLEMENTATION AND FUNDING BACKGROUND

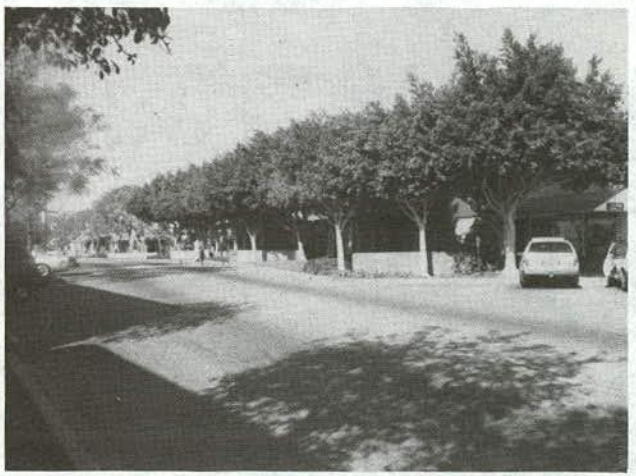
Both the Honolulu Street and Brand Boulevard projects have tried to recreate the downtown shopping center prevalent in the 1940's. This is in response to a loss of patronage resulting from the opening of newer shopping malls. In an attempt to protect these retail centers, merchants and the City of Glendale corroborated in the development of a rehabilitation plan.

Meetings were held with merchants and the Chamber of Commerce to determine how the decline of these urban areas could best be addressed. A task force, consisting of the Chamber of Commerce, merchants and representatives from the City of Glendale, was able to tailor the rehabilitation to meet community needs.

Brand Boulevard is located in a redevelopment area established in 1972. Because of its redevelopment status, the City of Glendale funded approximately one-third of the redevelopment project through tax increment financing. Assessments were made on property when the redevelopment area was established (this was identified as the base year). A tax rate was then applied to the area expected to benefit from the public improvement. Any increase in property tax from the base year was reserved for the redevelopment project.

MONTROSE SHOPPING PARK
(Honolulu Avenue)

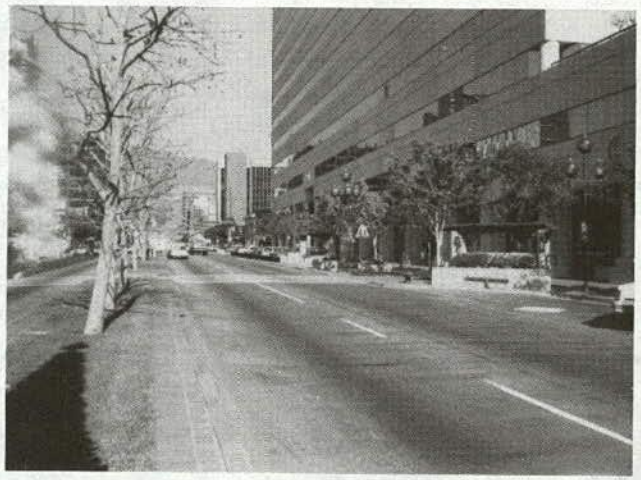
The street width reduction slows traffic and shortens the distance pedestrians must walk across the street.



Landscaping and brick walls serve as vehicular barriers.

This crosswalk was repaved to differentiate the walkway and street

Typical design Improvements found along Brand Boulevard



Brand Boulevard, a wide arterial, has been redesigned to better accommodate the pedestrian. A median equipped with curb cuts, landscaping and brick pathways has been provided.

The remainder of the funding came from a special assessment district. Similar to tax increment financing, assessment districts are assigned to private properties that have benefitted from the use of public monies.

Funding for the Montrose Shopping Park came from a capital improvement program in which funds were raised through an increase in sales tax. The City wide sales tax increase has gone toward revitalization efforts throughout Glendale. Funding for maintenance programs is currently provided through the sales tax increase. Efforts are underway to form an Assessment District similar to the Brand Boulevard project to supplement the maintenance funding pool.

EVALUATION OF FACILITIES

The revitalization of Honolulu Avenue and Brand Boulevard has been successful in creating a safer, more pleasant pedestrian environment. The design of the streets, in conjunction with the clearly marked crosswalks, reinforce the attitude that the pedestrian has the right-of-way. Automobiles drive slowly and drivers generally respect the pedestrian to a greater degree than in other areas.

Most of the parking for both sites is located either in off-site parking lots or on adjacent streets. The scarcity of on-site parking creates a need for a pedestrian system that facilitates walking.

Some parts of the Brand Boulevard design have been criticized. The street trees planted along the sidewalk are now the same height as the signs on the stores. Signs may be blocked from view for several years. Another flaw is the materials used in construction. The concrete aggregate mix used in sidewalk paving has been difficult to match when replacement is necessary.

Both revitalization projects, in general, have been deemed successful from a financial point of view. Merchant's revenues have been rising consistently since the malls have been redesigned. The City of Glendale has thought highly enough of both projects to expand them to other areas within the City. At least two similar projects have been proposed within the City of Glendale.

The following is a summary evaluation of Glendale's pedestrian improvements based on the defined set of criteria.

- level of use by pedestrian - both very active.
- accessibility - Honolulu Street is fair, most parking is located at either end of the street. Access to the shops located in the center of the mall is not very direct. Brand Boulevard improvements provide good accessibility.
- continuity of path longitudinally - very good for both locations. Sidewalks are continuous and well maintained.
- continuity of path laterally - excellent for both locations. All major crosswalks are clearly designated. Street widths are reduced at crosswalks.
- pedestrian delay - low; automobiles move slowly enough for them to stop when pedestrians step into the crosswalk.
- level of pedestrian hazard - Honolulu Avenue is low. Traffic moves very slowly and drivers respect pedestrians. Brand Boulevard speeds are low but automobiles backing out of parking spaces into the traffic lane results in distraction.
- clarity of directional information for pedestrians - crosswalks are clearly designated and occur at such frequent intervals that pedestrians rarely cross mid-block.
- aesthetics and environmental quality - good at both locations. The areas are well landscaped, well maintained and clean.
- security - fair; street lighting is good but walking at night after the stores close may be unsafe.
- overall "friendliness" of the pedestrian environment - Honolulu Avenue is excellent; this mall is small enough to give the impression of being in a small town. Brand Boulevard is good; it is a little more impersonal than Honolulu Avenue but the environment is conducive to walking.

SUMMARY OF LESSONS LEARNED

The City of Glendale has successfully accommodated the pedestrian in its redevelopment and revitalization efforts. Montrose Shopping Park and Brand Boulevard are two cases in point that retrofitting efforts are worthwhile. The increase in sales and property values in both areas indicate that the projects have been worth the financial investment.

Merchant involvement has proved important in the renovation process. Shop owners were a bit hesitant to fund these projects but it soon became apparent that they stood to benefit the most. A series of Task Force meetings were held with the business community and the City. In this way, the different interest groups were able to tailor design specifications to serve their needs and interests. Both projects took place over the span of at least ten years. This phasing reduced the financial burden placed on merchants.

FREDERICKSBURG, VIRGINIA

SITE LOCATION AND BACKGROUND

Located midway between Washington, D.C. and Richmond, Virginia, Fredericksburg is a city with a history that goes back to colonial days. Established in 1728 as a frontier port on the Rappahannock River, Fredericksburg evolved into a bustling community by the time of the Revolution. The growth of the city was slowed in the 19th century and many Civil War battles were fought near the area. Today, Fredericksburg is typical of many small American cities. An established main street commercial area became the heart of the CBD and residential areas grew up around this core. During the early 1970's many of the downtown businesses began leaving the downtown for locations in a new suburban shopping mall. This prompted the city to begin a program to revitalize the slumping downtown area.

Interest in the preservation of the downtown as a historical area began back in the 1950's with the formation of a local historic foundation. Over time, a 40 block area of downtown Fredericksburg was designated as the Historic Fredericksburg District (HFD). The HFD was officially placed on the state and national historic registers in 1970.

DESCRIPTION OF THE PEDESTRIAN FACILITIES

The existing facilities are on a six block section of Caroline Street, the one-way main street running through the CBD (see figure). In this area, brick sidewalks, ornamental lighting and landscaping have been installed. There are curb ramps at all intersections and the crosswalks are clearly marked. At the intersection of Caroline and George Streets, the curbs have been extended to slow the traffic, delineate on-street parking areas and shorten the pedestrian crossings.

The city also constructed additional landscaped parking areas between Caroline Street and the river. One of the lots is on the site of a former furniture store which had burned down. The site was purchased by the city and serves as the major pedestrian linkage between the parking lots and commercial area on Caroline Street. A stage was also erected on the site to accommodate concerts and other special events (e.g., Art in the Park, Concert Under the Stars, etc.).

While this may seem like a modest start, the city is planning to make similar improvements to Sophia Street, which runs parallel to Caroline Street and is next to the riverfront area. Construction is underway for a walkway along the river, which will serve as a riverfront pedestrian amenity, and also connect municipal parking areas to a proposed riverfront amphitheatre, as well as to the adjacent City Dock park area.

The photographs on the following pages show some of the existing pedestrian areas in Fredericksburg.

IMPLEMENTATION AND FUNDING BACKGROUND

A major reason for the revitalization of the downtown area is a real estate tax abatement program set by the city. Properties in the HFD that are purchased and rehabilitated are eligible for this program. This applies to structures used for commercial and residential purposes. The program has been such a success that between 1978 and 1983, 77 new businesses were added to the CBD.

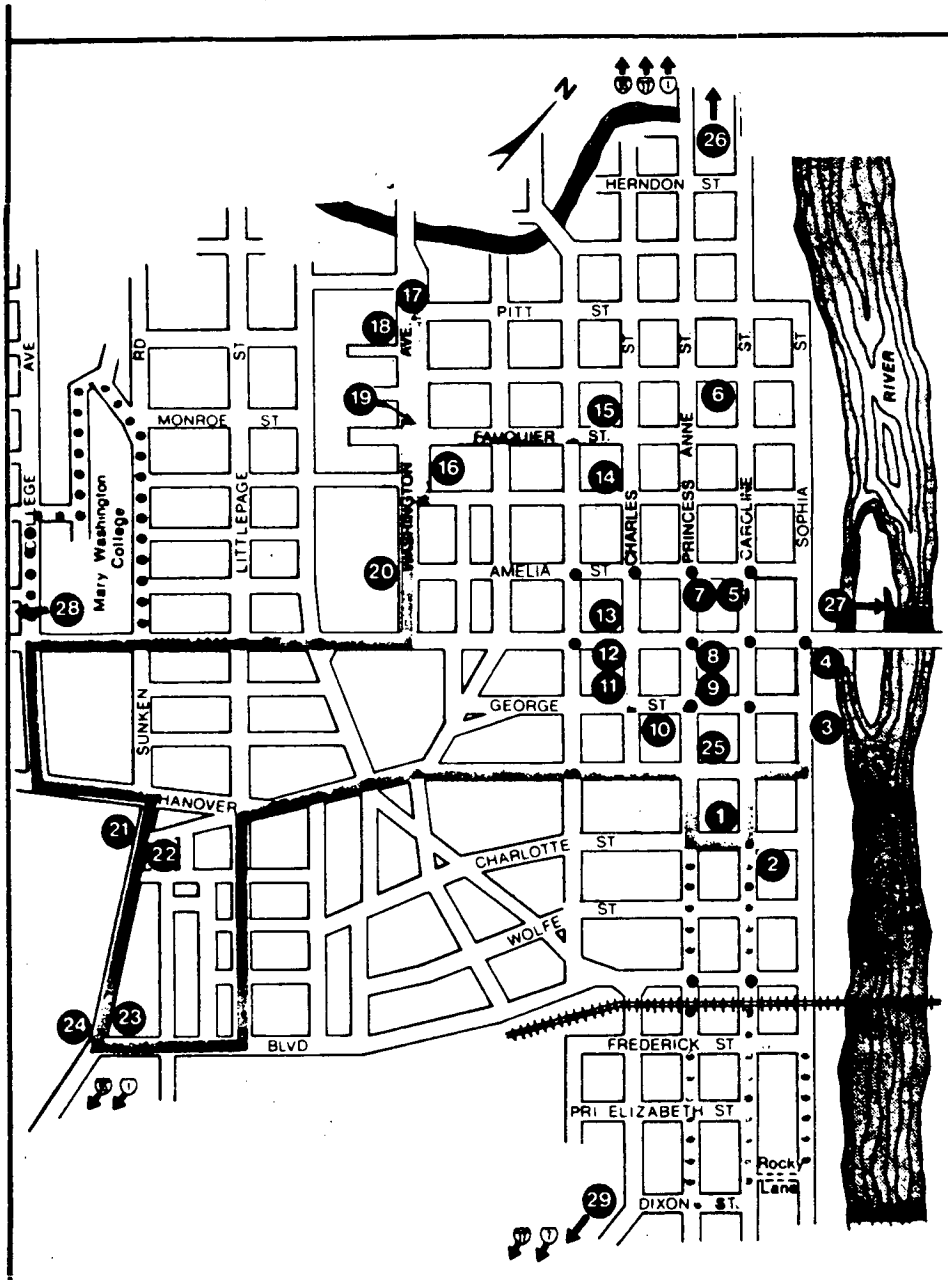
The street and sidewalk improvements have been funded by the city through a capital improvement program. The Sophia Street and riverfront improvements are part of this city financed program as well. The City's capital improvement program is driven by block grants from the State and Federal governments.

The city estimates that they spend $150,000 per year on sidewalk improvements. In residential areas within the HFD, the public works department will install brick sidewalks if property owners are willing to buy the brick.

EVALUATION OF FACILITIES

Although many more improvements are slated for the HFD, the work already done on Caroline Street bodes well for the entire area. The downtown area with its combination of shops and new residences has helped to make the CBD a place with activity throughout the day. The enhanced pedestrian environment combined with the clustered shops and restaurants acting as pedestrian magnets have created a new vitality for the area and a promising future. Undoubtedly, the historical character of the area and the tax incentives have been the major factors in its success.

The following is a summary evaluation of the HFD pedestrian facilities based on the defined set of criteria.



*1. BICENTENNIAL VISITOR CENTER
*2. HISTORIC FREDERICKSBURG MUSEUM
3. CENTER FOR CREATIVE ARTS—(SILVER-SMITH HOUSE)
4. COLONIAL TOBACCO WAREHOUSE—CA. 1760
*5. HUGH MERCER APOTHECARY SHOP
*6. RISING SUN TAVERN
7. BAPTIST CHURCH
8. CITY HALL
*9. ST. GEORGE'S EPISCOPAL CHURCH AND GRAVE YARD
10. PRESBYTERIAN CHURCH
11. MASONIC CEMETERY—1784
*12. JAMES MONROE MUSEUM
13. SLAVE AUCTION BLOCK
*14. MARY WASHINGTON HOUSE
15. ST. JAMES' HOUSE
*16. KENMORE—1752
17. THOMAS JEFFERSON FREEDOM MONUMENT
18. MARY WASHINGTON MONUMENT & GRAVE
19. HUGH MERCER MONUMENT
20. CONFEDERATE CEMETERY
21. BROMPTON
22. RICHARD KIRKLAND MONUMENT
*23. FREDERICKSBURG BATTLEFIELD VISITOR CENTER
24. NATIONAL CEMETERY
*25. MASONIC LODGE NO. 4, A.F. & A.M.
26. BELMONT, GARI MELCHERS MEMORIAL GALLERY
*27. CHATHAM
*28. I-95 INFORMATION STATION
*29. SHANNON AIR MUSEUM

Fredericksburg Historic District

- level of use by pedestrians - good; pedestrian activity grows annually.
- accessibility - good; no real barriers to accessibility.
- continuity of path longitudinally - excellent; grid street pattern has no breaks in the pedestrian network.
- continuity of path laterally (across the street) - good; the existing street network is relatively narrow fostering slow vehicle speeds and short pedestrian crossings.
- pedestrian delay - none; sidewalks appear to be wide enough to accommodate levels of use; signal timing seems adequate.
- level of pedestrian hazard - low; no real problems here, the one-way streets seem to make pedestrian crossings easier and safer.
- degree of conflict with vehicles - low; short blocks provide many conflict points; however, vehicle volumes are low.
- clarity of directional information for pedestrians - good; sidewalk and crosswalk areas are distinctive and well marked.
- directness of pedestrian path - good, grid street pattern forces pedestrians to use the shortest available paths.
- clarity of information provided for drivers - good; areas of high pedestrian activity are marked by the distinctive planting and lighting downtown.
- aesthetics and environmental quality - excellent; facilities are adequate but not overbearing; the historic nature of the HFD is complemented by the pedestrian amenities.
- security - excellent; area has day-long activity; lighting is good as well.
- overall "friendliness" of pedestrian environment - excellent; the historic charm, pedestrian oriented businesses and pleasant surroundings make this an ideal area to walk.

SUMMARY OF LESSONS LEARNED

It is apparent that the success of the efforts in the CBD is due largely to the redevelopment in the area. Business activity and tourism has increased, bringing with it increased pedestrian activity. The enhanced pedestrian environment has certainly helped. The listing of the HFD on both state and national registers of historic places has aided all aspects of the development. This is an advantage many other small towns

do not have. Local officials had many things working in their favor but it is not quite that simple. While the potential for an excellent pedestrian oriented downtown was created by Fredericksburg's past, it was the foresight of local planners which kept existing businesses in the area, added new businesses and improved housing stock in the downtown area. The property tax abatement program must be credited with creating the activity that is the heart of the downtown area. Although the HFD might have had the deck stacked in its favor, without some aggressive play by local officials, the pot might have been lost.

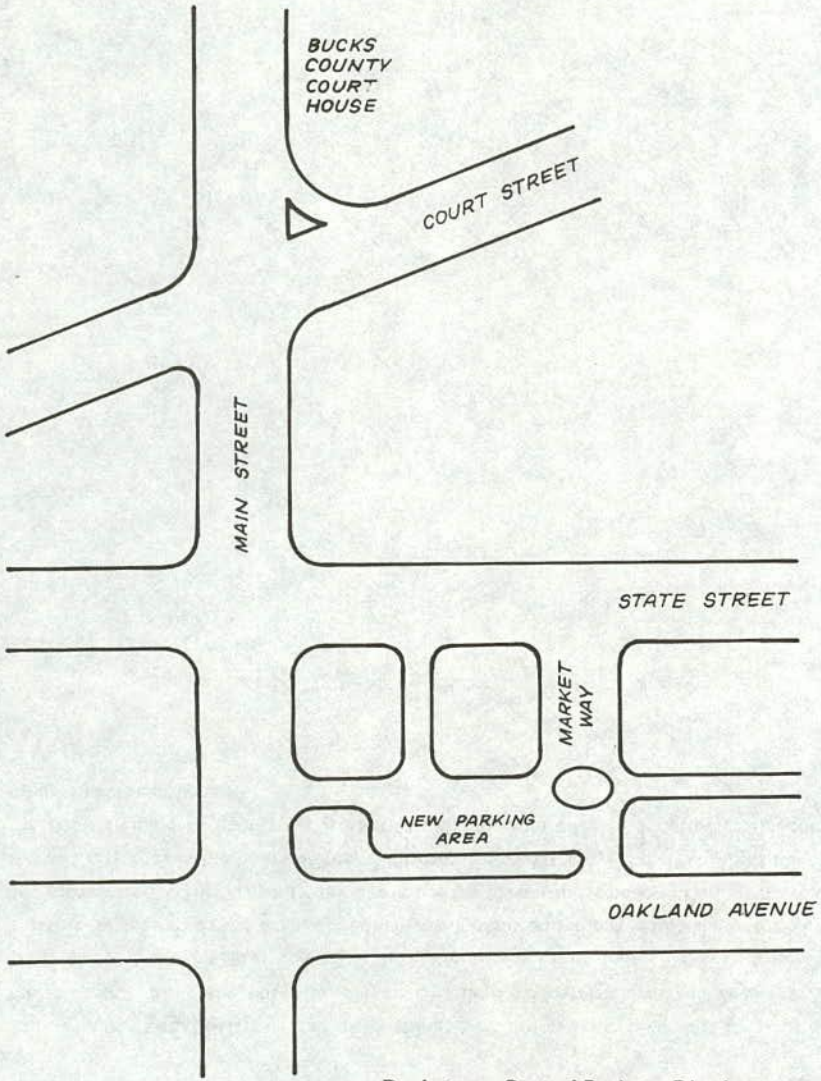
MARKET WAY, DOYLESTOWN, PENNSYLVANIA

SITE LOCATION AND BACKGROUND

Doylestown is in Eastern Pennsylvania about 25 miles north of Philadelphia. As the seat of suburban Bucks County, Doylestown is the home of many government offices and a vibrant old downtown. Like many downtowns in older eastern cities, the development pattern is moderately dense. Streets are relatively narrow and parking is scarce. In an attempt to add some additional parking to the CBD in 1980, Doylestown purchased a block of properties near the downtown commercial area, demolished many of the existing structures, and built three "vest pocket" parking areas. Using the space made available from the razed buildings and an existing network of alleys, 54 new parking spaces were created (see figure). Since some of the old alley system was lost to the construction of the parking lot, other links in the alley system lost some of their usefulness. One of these links ran from the parking area out to the heart of the commercial area on State Street. Realizing that this area should see some pedestrian traffic from the parking area to State Street and back again, an enterprising development consortium of local businessmen acquired the properties on either side of the alley way and began to develop the Market Way project.

DESCRIPTION OF THE PROJECT AND PEDESTRIAN FACILITIES

The primary idea of the development was to remodel the first story of the existing structures on either side of the alley to be retail spaces fronting on the alley, and have residential space created on the second and third floors. After they were developed it was intended to sell the individual retail and residential units as condominiums. In order to enhance the attractiveness of the area, the developer offered to turn the alley into a pedestrian mall, if Doylestown was willing to abandon the alley as a public right-of-way. A deal was struck and the alley became a wide pedestrian walkway between the parking area and State Street. The photographs on the following pages show the Market Way development.



Doylestown Central Business District

Entrance from Market Way to State Street

View from the end of Market Way looking toward the municipal parking lot

IMPLEMENTATION AND FUNDING BACKGROUND

It is fairly clear that this project came about through the initiative of the private sector. Although the parking area was acquired and built primarily through the use of a federal grant, the developers saw the possibility of having more pedestrian traffic in the area. This led them to the idea of turning the alley into a mall area. The entire Market Way project, property acquisition, remodeling of the units, and construction of the pedestrian way, was completely financed by private sector funds.

EVALUATION OF FACILITIES

The project has had its ups and downs. The housing units sold very quickly and the demand was such that many more could have been sold. The retail condominiums sold very well also. It was originally intended that these units would be sold to owner/occupant retailers, (thereby creating a place where each of the retailers felt a commitment to Market Way as a whole), but some were sold to speculative investors. There has been some quick turnover of the ownership of the retail units as well. Although there has been a nice profit for the seller each time, one wonders about the overall viability of the businesses located here, since many of the retail spaces have been converted over to professional office space.

Another factor involved is the parking lot users. It was anticipated that some of the people parking in the new lots would use Market Way to get over to the State Street area and the rest of the CBD. Most of the people using the parking area are county government employees, and as it can be seen in Figure 1, the location of the courthouse relative to the parking areas makes Main Street the most direct pedestrian route. Although Market Way does get used by pedestrians, its use might be greater if a different group of patrons was using the new municipal parking lot.

Market Way itself is brief, but pleasant. The walk area is nicely done, and there is ample pedestrian-level lighting. Using the set of defined criteria, the following is a summary evaluation of the Market Way pedestrian facilities:

- level of use by pedestrians - fair to good; lunchtime warm weather crowds are good, otherwise less than desired by local merchants.
- accessibility - good; flat grade, no steps.
- continuity of path longitudinally - excellent; good links at both ends.
- continuity of path laterally - poor; no real continuity of walking route across State Street at Market Way.
- pedestrian delay - low; no real problems at State Street.
- level of pedestrian hazard - moderate; on State Street parallel parking could cause some visibility problems.
- degree of conflict with vehicles - low; there are relatively low volumes and speeds on State Street.
- clarity of directional information for pedestrians - fair; unclear whether pedestrians should cross State Street at Market Way or go to nearest corner.
- directness of pedestrian path - good; a natural shortcut.
- clarity of information for drivers - poor; lack of signing, pavement markings, and continuous parallel parking give drivers no clue that pedestrians may cross the street at Market Way.
- aesthetics and environmental quality - excellent; nice, well maintained area.
- security - good; lighting and interior sight lines are good.
- overall "friendliness" of pedestrian environment - good; a pleasant shortcut through town.

SUMMARY OF LESSONS LEARNED

Although it would not necessarily be a panacea for their problems, local merchants think that if more pedestrians used Market Way, their businesses would do better. As can be seen in other case studies, sometimes other forces are at work in the marketplace. However, given that more pedestrians would increase business, the question becomes: "How does one get more people to use Market Way as a pedestrian facility?" One idea immediately comes to mind. This would entail changing the parking policy at the municipal lot to favor shorter term shopping parkers rather than all day county employees. This might create a greater volume of people wanting to get to State Street rather than up to the County Courthouse. An obvious lesson to be learned is that a pedestrian facility must directly link pedestrian magnets if it is to be an active, vibrant area. It is an unusual facility that can draw pedestrians away from

the most direct route. Planners would do well to adopt the philosophy of a shopping mall, in which department stores are located at the ends of the mall, generating traffic in front of the smaller stores. Unfortunately, this flexibility is often not available in a redevelopment project.

SITE LOCATION AND BACKGROUND

Iowa City is located in the eastern part of Iowa along Interstate 80 (I-80) in rural Johnson County. With a population of over 50,000, Iowa City encompasses more than half of the Johnson County residents. For a time, Iowa City served as the Iowa state capital. Today it functions as a business and retail center for the area and the home of the University of Iowa.

During the 1960's, the Iowa City CBD began to decline and retailers started leaving the downtown area for locations on the City periphery. In 1965, as an attempt to revitalize the aging downtown, the City Council formulated a renewal plan for the CBD. The plan was prepared in cooperation with the Federal government. Several of the stated objectives of the plan dealt with the safety and convenience of pedestrians. These objectives have been manifested in the current CBD.

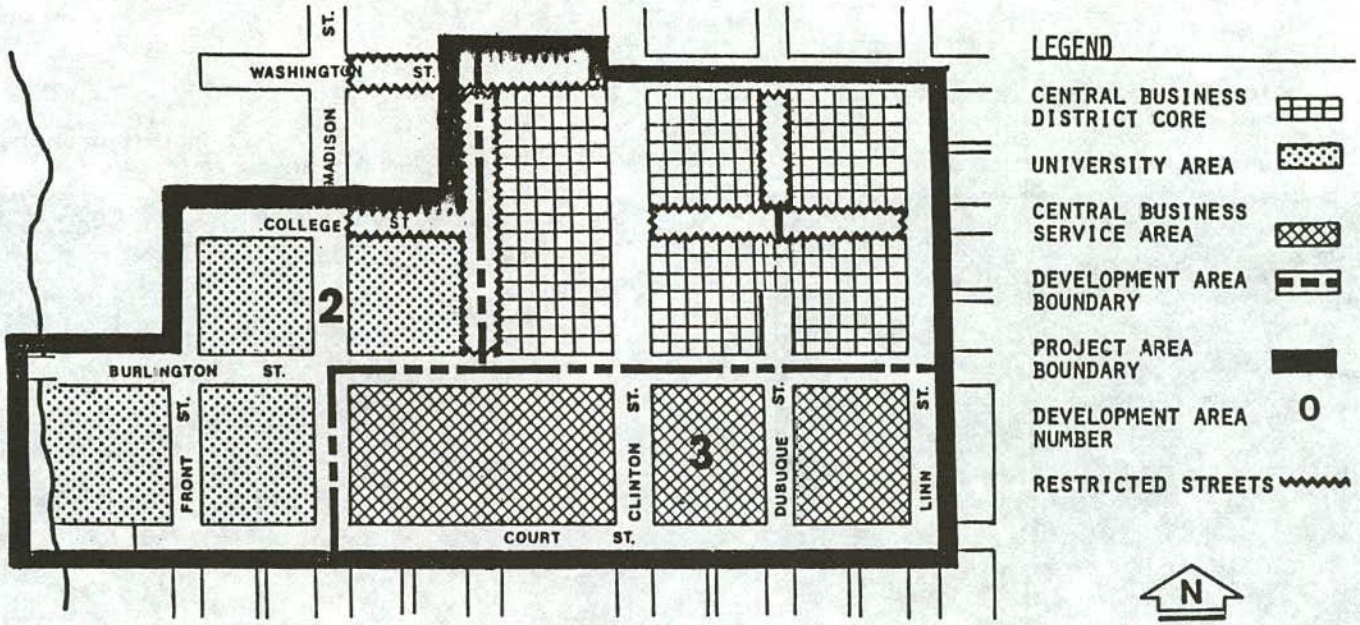
DESCRIPTION OF THE CBD AND PEDESTRIAN FACILITIES

The linchpin of the downtown renewal is an enclosed shopping mall called the Old Capitol Center (OCC). The OCC takes up the area between Clinton and South Capital Streets, and Washington and Burlington Streets (see figure). Internal circulation at the OCC allows for continuation of pedestrian movement along the College Street corridor. Off-street parking facilities are part of the OCC complex. Vehicles access the parking areas from ramps along the South Capital Street and Clinton Street sides of the OCC between Burlington and College Streets.

College Street, east of the OCC, has been closed to automotive traffic and been turned into a pedestrian mall. Dubuque Street, from College to Washington Streets, is also part of this pedestrian mall.

Washington Street, from Madison to Clinton Streets, is the bus transit interchange for the downtown area. Although a wider street width, one-way eastbound operation and location adjacent to the OCC makes Washington Street a logical choice as the transit interchange, pedestrian crossings in this area are often delayed because of the amount of traffic and the lack of a clear pedestrian sight line caused by parked buses.

The photographs on the following pages show a portion of the pedestrian network in the Iowa City CBD.



PROPOSED LAND USE

City-University Project
Project Number Iowa R-14
City of Iowa City, Iowa
July 1984
Exhibit R-213-B

Iowa City Central Business District

The open square at the intersection of the College Street and Dubuque Street pedestrian corridors.

Looking across Washington Street to the northern entrance of the Dubuque Street mall.

Entrance to the Old Capitol Center looking across Clinton Street at the west end of the College Street Mall. Note the continuation of the herringbone brick walk across the pavement on Clinton Street.

College Street Mall looking eastward toward the Dubuque Street area. Tables and benches have been provided for warm weather board game players.

College Street mall looking westward toward the Old Capitol Center. Note the benches, planters, and pedestrian level lighting.

Street vendor on the College Street mall.

IMPLEMENTATION AND FUNDING BACKGROUND

The Iowa City Urban Renewal Plan was approved in 1965. After the plan was approved, several legal actions were initiated to stop the plan from being implemented. The litigation covered potential conflict of interest problems within the City Council, choice of developer, and the location and use of parking ramps. Demolition of abandoned and condemned properties was completed in 1974. Construction of the College Street mall and OCC was begun in 1975 and completed in 1980.

The acquisition and demolition of downtown properties and construction of public improvements including the College Street mall were funded through Federal urban renewal funds. These funds were provided on a 75 percent Federal, 25 percent local match basis. The development of the OCC was funded by a group of local investors called Old Capitol Associates (OCA). Old Capitol Associates purchased the vacant land from Iowa City and then retained a developer, who specialized in shopping centers, to build the OCC.

OCA and their developer did not have a totally free hand in the development of the OCC. The Urban Renewal Plan required the redeveloper to adhere to the building requirements and design objectives of the plan. The City Council also had approval power over any of the redevelopment plans.

EVALUATION OF FACILITIES

Generally, the pedestrian areas in Iowa City are a delight. The combination of the renewed downtown, the University of Iowa campus, and the green lawns and historic buildings to the north of the CBD make the pedestrian environment one that is extremely friendly. Amenities, signals, and lighting provide a safe and pleasant route throughout the area. The only weak links in the system appear to be the pedestrian crossings near the Washington Street transit interchange and the intersection of Burlington and South Capitol Streets, since this location handles most of the traffic trying to access the OCC parking facilities. While these places do cause some concern, they are areas where pedestrian delay seems to be a bigger problem than pedestrian safety. Efforts have been made to improve the crossing near the Washington Street transit interchange. There is a standing policy that buses on Washington Street yield to the pedestrians at the crosswalk locations.

The following is a summary evaluation of the Iowa City CBD pedestrian facilities based on the defined set of criteria:

- level of use by pedestrians - excellent; the pedestrian-oriented student body of the University of Iowa gives the area an all day pattern of usage.
- accessibility - excellent; no real topographic barriers in the CBD; curb ramps are included at most crossing areas.
- continuity of path longitudinally - excellent; the path continuity of the College Street corridor, through the OCC, and back toward the University is a prime example of this.
- continuity of path laterally (across the roadway) - good; where the pedestrian walks cross streets, the crossings are signal controlled; width of Washington Street near the transit interchange is part of the overall problem there.
- pedestrian delay - low; in most sections there is minimal delay; again, the Washington Street area causes some problem.
- level of pedestrian hazard - low; streets have relatively few sight line obstructions or other hazards; the only exception is the transit interchange area.
- degree of conflict with vehicles - low; volumes are not excessive except near the OCC parking ramps along South Capitol Street.
- clarity of directional information for pedestrians - good; little, if any, pedestrian signing, however, fairly consistent use of path delineation (e.g , brick herring bone sidewalks and crosswalks) gives good sense of path direction.
- directness of pedestrian path - good; network is mostly a gridiron pattern.
- clarity of information for drivers - good; many crosswalks in the area are made of a different pavement; major midblock crossings are signalized.
- aesthetics and environmental quality - excellent; a refreshing view of how streetscapes can be in a small CBD; excellent use of materials; amenities provided in the proper places; well maintained.
- security - good; there appear to be no major crime problems, however, there is a late night vandalism problem with respect to landscaping materials and furnishings, according to those responsible for maintenance. It is not "major" but vandalism is more common than rare.
- overall "friendliness" of the pedestrian environment - excellent; a very nice place to walk.

SUMMARY OF LESSONS LEARNED

Although the plan took over 15 years to go from the planning stage to completion, the Iowa City experience shows the wisdom of having a coordinated plan and sticking to it. A principal reason that pedestrians received so much attention in the final product was because they are prominently featured in the plan. Another reason for the overall success of the downtown area is that Iowa City planners recognized that the University of Iowa and surrounding community could serve as generators of pedestrian trips as long as they had something to walk to, i.e., the downtown redevelopment.

Iowa City shows that certain items are key to the success of facilities such as this:

- Requiring new development or redevelopment, through appropriate government powers, to bring pedestrian elements into the total design from the very beginning.
- Give people a reason to get out of their cars and walk by providing a density in the development that favors travel in a pedestrian mode.

SITE TYPE AND BACKGROUND

Decatur, Illinois, was founded in 1829, named after American naval hero, Stephen Decatur. Located 175 miles southwest of Chicago, the city has long been a commercial center in central Illinois. Much of the local industry revolves around the processing of corn and soybeans. With a population of over 90,000, Decatur ranks as the fifth largest city in the state.

In the late 1960's, the city planners became aware of the changing complexion of the downtown areas of other small American cities. Faced with competition from regional shopping facilities built outside the downtown area, many small cities became involved in a fight to keep business in the CBD and their downtowns viable. This was usually done through some sort of inducement, such as financial incentives or downtown renewal programs. At the time, planners in Decatur did not feel that there was an "urban flight" problem in their city. Other cities nearby (Springfield and Urbana/Champaign) were planning for renewal programs in their downtowns. Even though there did not appear to be a "crisis" in the Decatur CBD, the local planners felt that they should institute a downtown improvement program to stave off any future problems and "keep up with the Jones'," the other small cities in Illinois.

DESCRIPTION OF THE FACILITIES

The improvements made are in the Main Street and Water Street corridors in the downtown area (see figure). The work done in the Main Street corridor runs from Wood Street north to North Street. Here the curb lines have been extended in places to give more room for planters and street furniture. Pedestrian level lighting has been used here as well. East of Main Street is Water Street. The work in this corridor extends from Main Street to North Street. A portion of the Water Street corridor has been closed to vehicular traffic and turned into a pedestrian mall, running from Prairie Street to North Street. There is a break in the mall to allow for the passage of William Street. This entire area has extensive use of plantings, street furniture and pedestrian level lighting.

The photographs on the following pages show some of the downtown Decatur area.

Looking north on Main Street. Note extended sections of curb.

Looking south on Water Street near Central Park. Note planters and pedestrian level lighting.

Looking north on Water Street just south of the Water Street mall.

IMPLEMENTATION AND FUNDING BACKGROUND

As mentioned before, the improvements made to the downtown area were not done as an act of desperation to save the Decatur CBD. The program was mainly an effort to keep Decatur competitive with its surrounding neighbors, and create a pleasant atmosphere downtown. The Main Street Beautification Program was completed in 1970 and was funded by the city and local merchants. The funding was made up of a one-third contribution by the city from its general revenue fund, and a two-thirds contribution by means of a special assessment from the landowners with property adjacent to the improved corridors.

EVALUATION OF FACILITIES

Downtown street closures in some cities have been reopened in response to public pressure to make areas more automobile accessible, but after 15 years the pedestrian mall and other improvements in the Decatur CBD are still in place. Today there seems to be no special notice given to the area, and it is just accepted as a part of the city. Over the years, the regional malls have popped up outside of town and several anchor stores have been lost, but for the most part the downtown has remained alive.

The following is a summary of the Decatur pedestrian facilities based on the defined set of criteria:

- level of use by pedestrians - good; use has remained fairly high throughout the years.
- accessibility - good; no real barriers; most intersections have ramps.
- continuity of path laterally - good; many of the intersections in the downtown area have flared sidewalks to shorten the crossing distances.
- pedestrian delay - low; no real delay problems.
- level of pedestrian hazard - low; accident potential is relatively low.
- degree of conflict with vehicles - moderate; relatively high volumes on Main Street as it is part of a one-way couplet that makes up U.S. 51 as it passes through Decatur. As a one-way street, however, Main Street is easier to cross than two-way streets with similar volumes.
- clarity of directional information for pedestrians - good; network layout is relatively clear.
- directness of pedestrian path - good; pathway is the only one available in the grid network.
- aesthetics and environmental quality - good; sidewalks are wide and well lit; area is holding up well for its age.
- security - good; appears to be no crime or vandalism problems.
- overall "friendliness" of the pedestrian environment - good; an enjoyable pedestrian area.

SUMMARY OF LESSONS LEARNED

One of the major lessons to be learned from the Decatur experience is that planning does not have to be done on a crisis basis. Often pedestrian "planning" is done defacto in a situation where many compromises have to be made. In this situation, the city planners in Decatur had the time to assess the needs of the city, make a plan that met their needs and implement it by having the beneficiaries of the plan (the merchants) each pay their fair share. The types of improvements made in the Decatur downtown have become commonplace in many towns of similar size. Although the driving force behind these improvements has been economic revitalization, the street modifications are usually of functional benefit to pedestrians. It should also be noted that downtown streetscape improvements are not a panacea for economic revitalization. Factors that control economic vitality go far beyond street improvements. However, such improvements can complement other revitalization efforts.

CASE STUDY POSTSCRIPT

The pedestrian mall was re-opened to vehicular traffic in July, 1986. One tree planter was removed, a ramp was constructed at the south end of the mall, 27 parking spaces were marked, and appropriate street signs were added.

The mall now serves as a one-way, one-lane street from North Street to South Park Street, with traffic flowing south. The bricks laid for the pedestrian mall remain, with parking spaces simply marked on the bricks. The mall was opened due to pressure from a downtown business association seeking additional CBD parking.

INTERNATIONAL DRIVE, ORLANDO, FLORIDA

SITE TYPE AND LOCATION

International Drive is an arterial street at the southwest border of the City of Orlando, Florida (see figure). Located less than ten miles from Disney World, International Drive has become a primary area for tourist-related development, particularly hotels.

The sections of interest are located in Orange County, just south of the City of Orlando. The section north of Sand Lake Road is a four-lane undivided facility developed in the classic style of commercial strip. There are several major hotels on the north side, as well as a number of family-style and fast food eating establishments. There is also a water slide located on the east side. International Drive south of Sand Lake Road is also largely hotel and other commercial development, but of more recent vintage. It serves a major one-owner development site called Plaza International. Although the composition of land uses in the Plaza International development is similar to that along International Drive north of Sand Lake Road, accommodations for both pedestrian and vehicular traffic are dramatically different.

DESCRIPTION OF STREET SYSTEM AND PEDESTRIAN FACILITIES

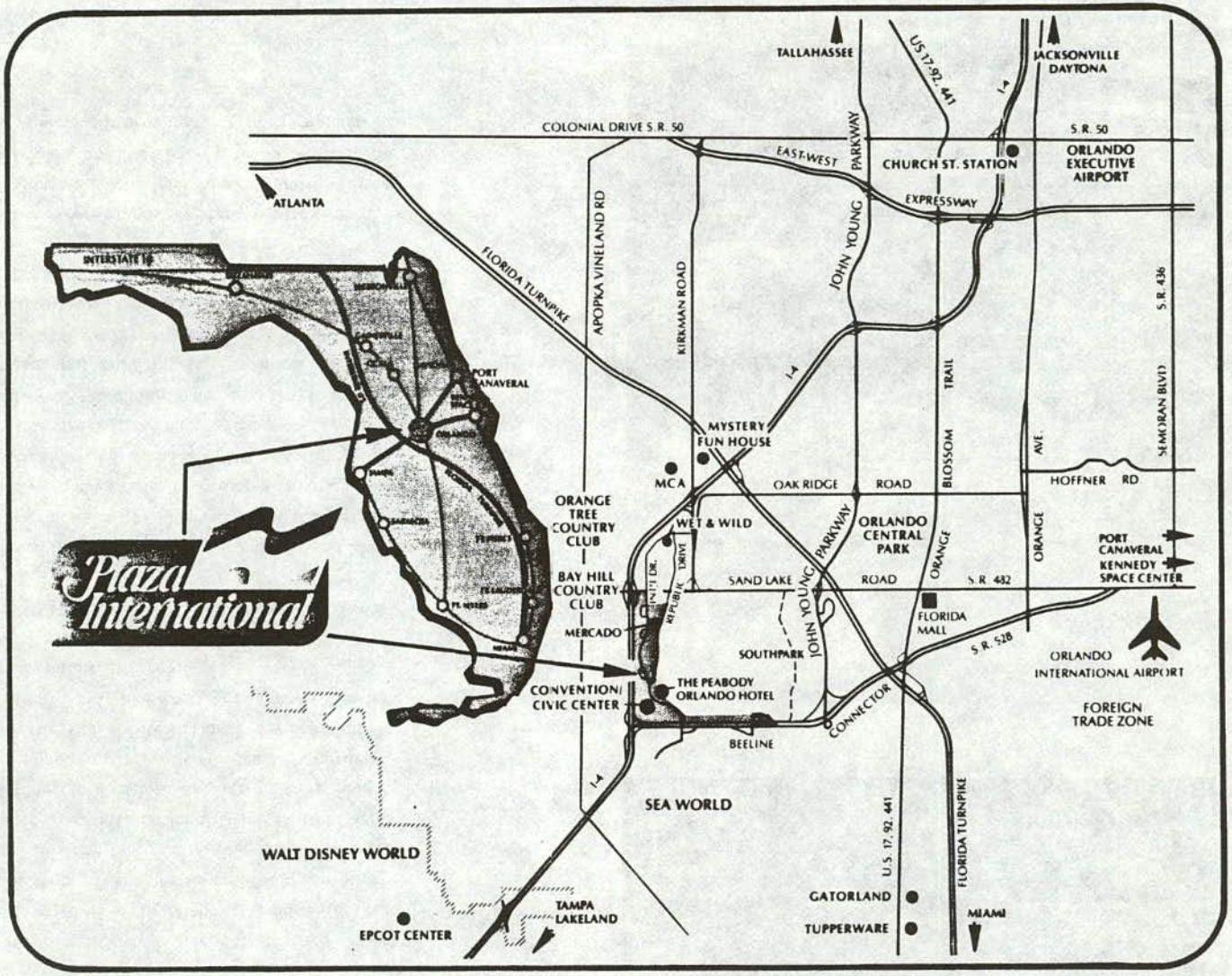
As seen in the accompanying photographs, International Drive north of Sand Lake Road is representative of commercial strip development in hundreds of other locations across the country. A significant pedestrian demand exists for crossing International Drive at many points along its length, because the eating establishments and hotels are, for the most part, on opposite sides of the street. A heavy pedestrian flow also exists at the signalized intersection of Sand Lake Road and International Drive.

Also on the north side, driveways are frequent, resulting in significant vehicular turning conflicts. Pedestrians are only one of many competing demands for the attention of drivers, and are sometimes difficult to spot amongst the background of signs. Although sidewalks are provided on both sides, setbacks vary, giving the immediate impression of a lack of continuity.

International Drive south of Sand Lake Road stands in stark contrast to the northern section. The southern section incorporates a four-lane divided facility with a 40 foot median. The median is heavily landscaped, and the alignment is curvilinear, to better control traffic speeds. Pedestrian walkways are provided across the median at

View of International Drive north of Sand Lake Road.

International Drive south of Sand Lake Road.



Location of International Drive within Orlando, Florida

certain points. Although there is currently less pedestrian activity on the south side, (because it is still being developed) it is clearly a more friendly pedestrian environment.

The southern section of International Drive was built primarily to serve the mixed-use Plaza International development. The entire development incorporates some 720 acres, and 8,000 to 10,000 hotel rooms are eventually planned. Approximately half of these are now built. There is a small shopping center and both fast food and sit down dining facilities, but they are arranged in a much more coordinated fashion than the comparable facilities on the north side. Unified land ownership has made this possible.

IMPLEMENTATION AND FUNDING BACKGROUND

There are several reasons for the difference in the roadway and pedestrian facilities provided on the northern and southern sections of International Drive. The primary reason for the difference is the nature of the development that has taken place. The section north of Sand Lake Road developed in the early 1970's along with the opening of Disney World. The area was truly a support facility for Disney World, providing overnight accommodations and dining facilities. However, land ownership was quite fragmented, and development took place in piecemeal fashion, site by site. At the time development was taking place, existing County plans, ordinances and regulations were inadequate to promote the continuity necessary for efficient vehicular and pedestrian movement. The development occurred very rapidly, and the adverse conditions were created before action could be taken to correct them. Although landscaping at some of the establishments is nicely done, there is little consistency between the sites. Even where there is sidewalk, the setback from the roadway varies, giving visual evidence of the lack of coordination. Some of these problems occurred because of constraints on the development of each individual site.

The Plaza International development was master planned from the beginning. Although County regulations generally governed the provision of road and pedestrian facilities (e.g., sidewalks are required on both sides of all commercial roadways), the design guidelines imposed by the developer were substantially more stringent. The planning of the project included the development of a 150-page document containing development guidelines to which each individual developer was required to build. The guidelines covered items ranging from roadway cross sections and right-of-way requirements to sidewalk design, landscaping and lighting. Landscaping costs on International Drive itself were estimated at approximately $30 per linear foot. Landscaping on some of the side roads cost substantially less than that. Maintenance of the landscaping and roadway facilities is provided by the County, but financed through a special assessment district, to which each individual property owner or developer contributes.

EVALUATION OF FACILITIES

The most significant pedestrian problem on the north side is that of crossing International Drive. Although pedestrians appear to be adequately accommodated at the traffic signal, there is heavy demand for crossings all along its length. Pedestrians will simply not go out of their way to take advantage of the signal. Pedestrians are routinely observed crossing north of the Sand Lake Road intersection even though the risk is substantially higher. Pedestrians can be seen standing on the centerline with traffic passing by within several feet on either side. There is rarely a sufficient gap in traffic to allow a complete crossing of International Drive in one movement. Although it is probably too late for a median, some carefully placed pedestrian refuge islands would go a long way toward making the crossing of International Drive easier and safer. They may even have some influence on reducing vehicular speeds. Ideally, a raised island would need to be provided, taking approximately four feet of width from the paved roadway surface, resulting in a slight narrowing of lanes.

Improved handling of driveway access points would also have helped to ease the problems on International Drive north of Sand Lake Road. This would have taken ample foresight, however, and the relatively small size of the parcels would have made this difficult. The development of guidelines and standards for driveway design and pedestrian facilities might have forced some parcel assembly, which would have avoided at least some of the problems. Parcel size has a major influence on opportunities afforded for improving the pedestrian environment, since coordinated planning can more easily take place on larger sites. Plaza International had a significant advantage in this regard.

The following is a summary evaluation of the pedestrian facilities along International Drive based on the defined set of criteria:

- Level of use by pedestrians - extremely heavy due to the active tourist trade.
- Accessibility - excellent on the south side, poor on the north side.
- Continuity of path longitudinally - excellent on the south side, good on the north side; on the north side, sidewalks are generally provided, except for a few short missing links.
- Continuity of path laterally (across the roadway - excellent on the south side, poor on the north side. The primary deficiency is the lack of a median on the north side.
- Pedestrian delay - low on the south side, severe on the north side. Traffic congestion is extremely heavy on both sides, but gaps are easier to find on the south side due to the median.
- Level of pedestrian hazard - low on the south side, severe on the north side.
- Clarity of directional information - fair; no special pedestrian signing is provided on either side.
- Directness of pedestrian paths - good on both sides.
- Aesthetics and environmental quality - excellent on south side, poor on north side. The south side creates a completely different visual impression from the north side. The north side represents the classic "strip commercial" look, while the south side creates more of the impression of a parkway through a scenic area.
- Security - no known problems on either side.
- Overall "friendliness" of the pedestrian environment - excellent on the south side, poor on the north side.

SUMMARY OF LESSONS LEARNED

In retrospect, most planners and designers would undoubtedly agree that the north side of International Drive could have been greatly improved. The current conditions are largely due to the very rapid and unpredicted development, in combination with constraints on land development and parcel size. Perhaps one the most significant lessons is that medians should always be included on a roadway facility of four or more lanes, even if the type and amount of development cannot be predicted. Development will always occur eventually, and there will always be some pedestrian demand across the facility. The landscaping need not be elaborate, as was the case on the south side of International Drive, for the facility to functionally improve pedestrian access.

The case study also reinforces the idea that pedestrians will usually take the more direct route, even though it involves greater hazard. Rather than trying to discourage pedestrian utilization by making access more difficult, access should be facilitated by making the desirable crossing points easier and safer. Installing traffic signals specifically for pedestrians is usually impractical and costly. Additional signals along this section of International Drive are unwarranted. However, a careful placement of refuge islands would help the current situation, and should probably be more widely applied in many similar situations. The case study also points out the importance of having effective regulations and ordinances in place to guide planning and design.

U.S. ROUTE 51/ILLINOIS STATE UNIVERSITY, NORMAL, ILLINOIS

SITE TYPE AND LOCATION

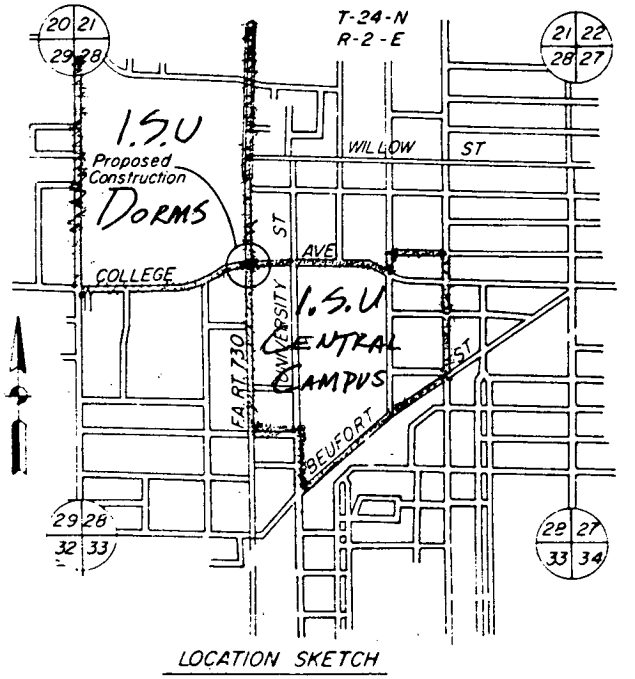
Normal, Illinois is located approximately 100 miles southwest of Chicago. Part of the Bloomington/Normal urbanized area, the town is home to the campus of Illinois State University (ISU). The plan of the ISU campus is such that the bulk of the administrative and classroom buildings lie on the east side of a major arterial road (U.S. Route 51), while the dormitories are on a parcel of land cattycornered from the main campus area, west of U.S. Route 51 (see figure). This location of the dormitories relative to the classrooms created a major problem whenever classes changed. During one class change period (approximately 10 minutes) several thousand students would need to cross Route 51. There were many times when traffic on the road would be virtually stopped by the flood of students crossing the intersection of College Avenue and Route 51. It was estimated that 14,000 students crossed the area every day. Although there was no serious accident problems at the site, the pedestrian/vehicle conflict problems caused Illinois Department of Transportation (IDOT) officials to seek a solution. After trying several traffic operations solutions (e.g., signal timing) to no avail, they decided to build a grade separated pedestrian tunnel to solve the problem.

DESCRIPTION OF THE PEDESTRIAN FACILITIES

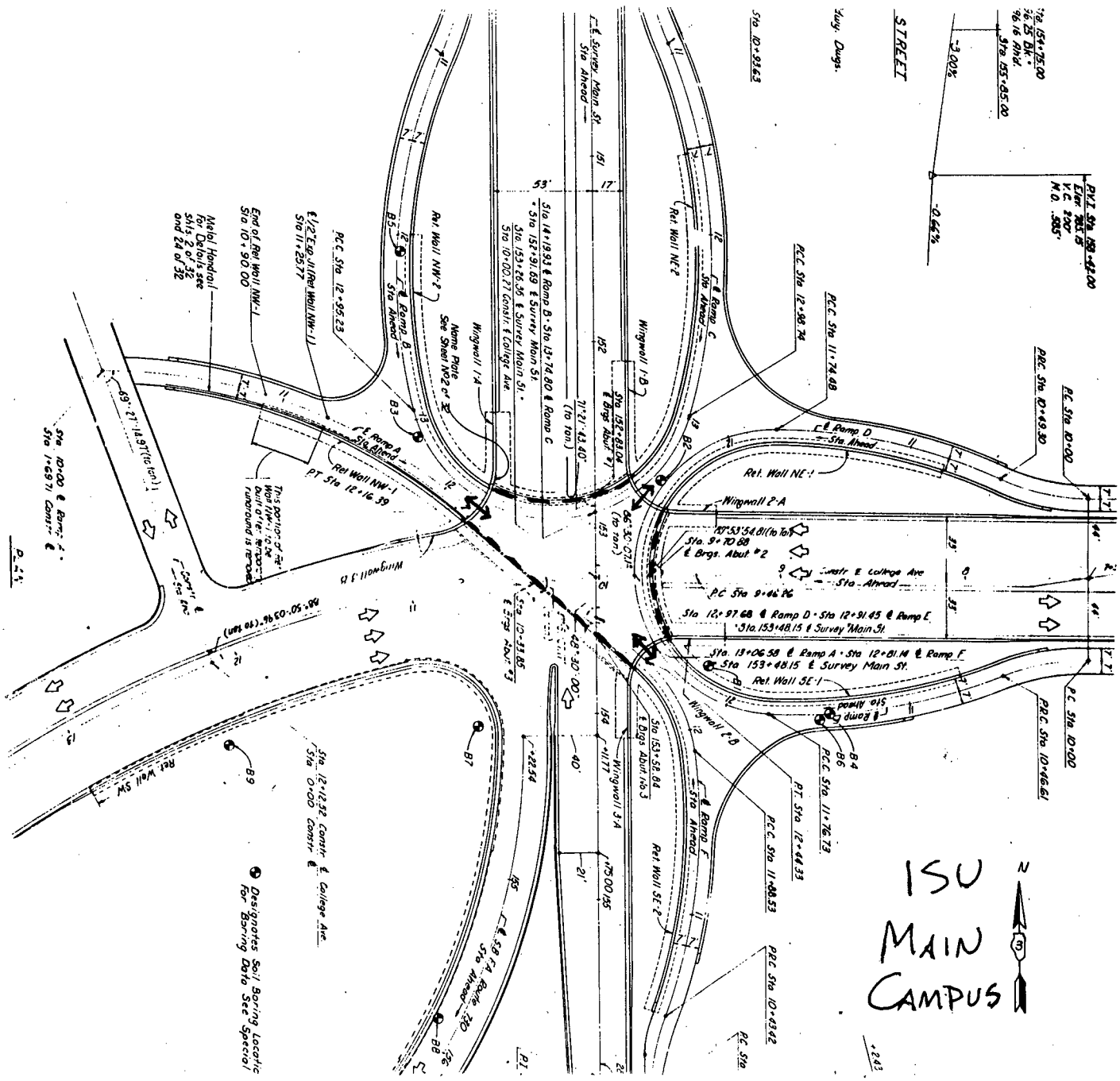
After making several studies and finding what the predominant pedestrian movements were, the decision was made to build a modified "Y" or triangular shaped tunnel to accommodate the major movement of students between the northwest and the southeast corners and a minor movement between the northwest and southeast corner and the northeast corner (see figure).

The existing vertical alignment of the roads had the intersection of Route 51 and College Street lying in a sag vertical curve. Rather than build a tunnel under the intersection, the intersection was "raised" to be more in line with the approach grades.

To ensure that the tunnel is used and not bypassed by the students, the facility has been designed to make the tunnel the most convenient route. The pathways leading to the tunnel begin to slope downward quite a distance from the tunnel. As the intersection is approached, the only way to get up to the intersection to cross it at the



Location of Illinois State University Campus



General Plan of Pedestrian Tunnel

vehicle level, is to climb up a retaining wall, scramble up a grade and climb over a concrete barrier. On the roadway itself there are no sidewalks or refuge islands near the intersection. It is much more convenient to use the tunnel.

The tunnel is designed so that it can accommodate bicyclists as well as the pedestrian, and it is fully lit 24 hours a day. There appears to be no structural or drainage problems, and there are no real security problems. The area has no graffiti, but the sheet metal hung ceiling has a significant number of dents and dings. The source of this problem is unknown (it is suspected that students with baseball bats may have something to do with it).

IMPLEMENTATION AND FUNDING BACKGROUND

The planning of the facility was a cooperative effort between officials of ISU, the town of Normal, and IDOT. While all three groups had input into the design process, the final designs and specifications were done by IDOT. Funding for the project came entirely from IDOT.

EVALUATION OF FACILITIES

The tunnel seems to be the solution to the problem. It is used by the students, and there are no serious operational problems with it. It appears that the impetus for the project came from benefits accruing to both pedestrian and vehicular traffic. The following is a summary evaluation of the ISU campus connector tunnel based on the defined set of criteria:

- level of use by pedestrians - excellent; volumes are high and there is no alternate route.
- accessibility - excellent; ramps/sidewalks are very manageable grades.
- continuity of path longitudinally - excellent; entrances and exits lead directly to existing sidewalk network.
- continuity of path laterally (across the road) - excellent; the crossing is grade separated.
- pedestrian delay - none; wide entrances and exits (20 feet) are adequate for the high volumes.
- level of pedestrian hazard - none; hazards are non-existent, and geometric design ensures that little or no pedestrian traffic will cross at vehicular level.
- degree of conflict with vehicles - none; there are no conflicts.
- clarity of directional information for pedestrians - good; once in the tunnel, direction to desired exit may not be clear enough.
- directness of pedestrian path - excellent; even though the design forces the choice of the path, it is also the shortest route for the predominant movement.
- aesthetics and environmental quality - good; the area is well maintained.
- security - good; there are no crime problems, but vandalism does exist (i.e., damage to the ceiling). The lack of security problems can be at least partially attributed to the clear, open sight lines.
- overall "friendliness" of pedestrian environment - good; much more efficient way to get from one side of campus to the other.

SUMMARY OF LESSONS LEARNED

The key feature of the project is that it was designed to be used by pedestrians. Eliminating the choice of using any other path to cross the intersection, by making the tunnel the most convenient, most direct and safest route to access the different sides of campus makes this project a success. Often, pedestrian bridges or tunnels involve a "climb" up or down, stairs or ramps to take the safest route. Even when the bridge or tunnel is completed, officials often find the road is being crossed at grade despite the fact that there is a safer, albeit less convenient/more strenuous means of crossing the road. In the case of the ISU tunnel, one has to climb up or down to take the less safe route.

The choice of which route to take becomes very clear. A similar design has been used in Europe, specifically in the new town of Stevenage in the U.K. Tunnels, rather than overpasses are used, with gradual slopes, making use of the pathways easy and direct. More thought should be given to these designs in the U.S.

TRAMWAY BOULEVARD
ALBUQUERQUE, NEW MEXICO

SITE TYPE AND LOCATION

Tramway Boulevard is a recently constructed arterial street in Albuquerque. A five-mile stretch of Tramway Boulevard was constructed in 1983. Along with the roadway construction, a series of pedestrian and bicycle overpasses were built to provide convenient, safe connections between pedestrian trip generators and other parts of the community.

DESCRIPTION OF STREET SYSTEM AND PEDESTRIAN FACILITIES

The following page provides a map of the Tramway Boulevard corridor and indicates the location of pedestrian overpasses. Tramway Boulevard was constructed as a four-lane divided facility, with intersections spaced at approximately ½ mile intervals. It is eventually planned that the roadway be widened to six lanes. The road already carries heavy traffic volumes and has a speed limit of 50 mph, presenting a significant barrier to pedestrian crossings. Although pedestrians may cross at signalized intersections, the overpasses provide a safer and more secure route with no delay.

Photographs are provided of several of the pedestrian overpasses. The approaches are ramped for handicapped access, with fencing provided for enclosure.

IMPLEMENTATION AND FUNDING BACKGROUND

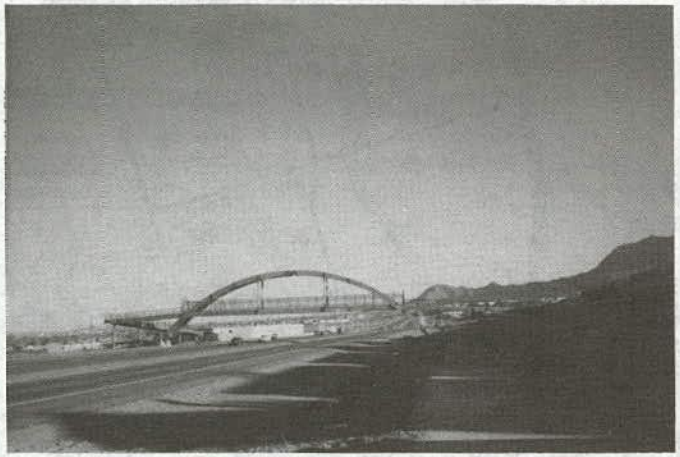
The pedestrian overpasses were part of the overall improvement plan for Tramway Boulevard, and funded along with the roadway construction project. Funding for the Tramway Boulevard overall improvement came from the city and state. The state funded 100 percent of the overpass cost. Initiative to include the overpasses was taken by the local transportation department. It was recognized that the new facility would create some pedestrian accessibility and safety problems and that alternative means of crossing the facility were needed. However, the motivation for the inclusion of overpasses into the plan was most likely a combination of the recognition of pedestrian need as well as keeping the community content with the overall project. The total cost for the four overpasses was just over $700,000.

COPPER OVERPASS

A typical overpass along Tramway Boulevard.

ROVER OVERPASS

The sidewalk connection with this overpass requires little inconvenience for the pedestrian.



COMMANCHE OVERPASS

This overpass is located approximately 100 feet north of the intersection, which makes it easier to use the street and cross with the green light.

LEXINGTON OVERPASS

This overpass connects to a sidewalk elevated above the roadway. If individuals walk along the road, access to the overpass is inconvenient.

EVALUATION OF FACILITIES

Many overpasses constructed in the past have been underutilized, as pedestrians continue to walk at street level even though the overpass is available, sometimes directly above the street crossing. The overpasses along Tramway Boulevard also experience this problem. Counts conducted along several of the overpasses indicate that only 11 percent of the pedestrians crossing in the vicinity of the overpasses actually use the overpasses rather than the street level crossing. The volume of pedestrians crossing the street at these locations averages an estimated 65 persons per day.

The key to the operation of overpasses involves providing direct connections between the pedestrian trip generators, designing facilities so that they are easily accessible. For example, ramps that do not require the pedestrian to backtrack up a ramp reduce the time necessary to cross the street via the overpass. Several of the overpasses along Tramway require the pedestrians to backtrack. This is most likely the reason for the low pedestrian use.

Another negative aspect of the Tramway Boulevard project is the lack of longitudinal pedestrian facilities. Although the demand is probably light, there will almost certainly be occasion for some pedestrians to walk down the road, and separate facilities would have been helpful.

The following is an evaluation of the pedestrian facilities along Tramway Boulevard based on the defined set of criteria.

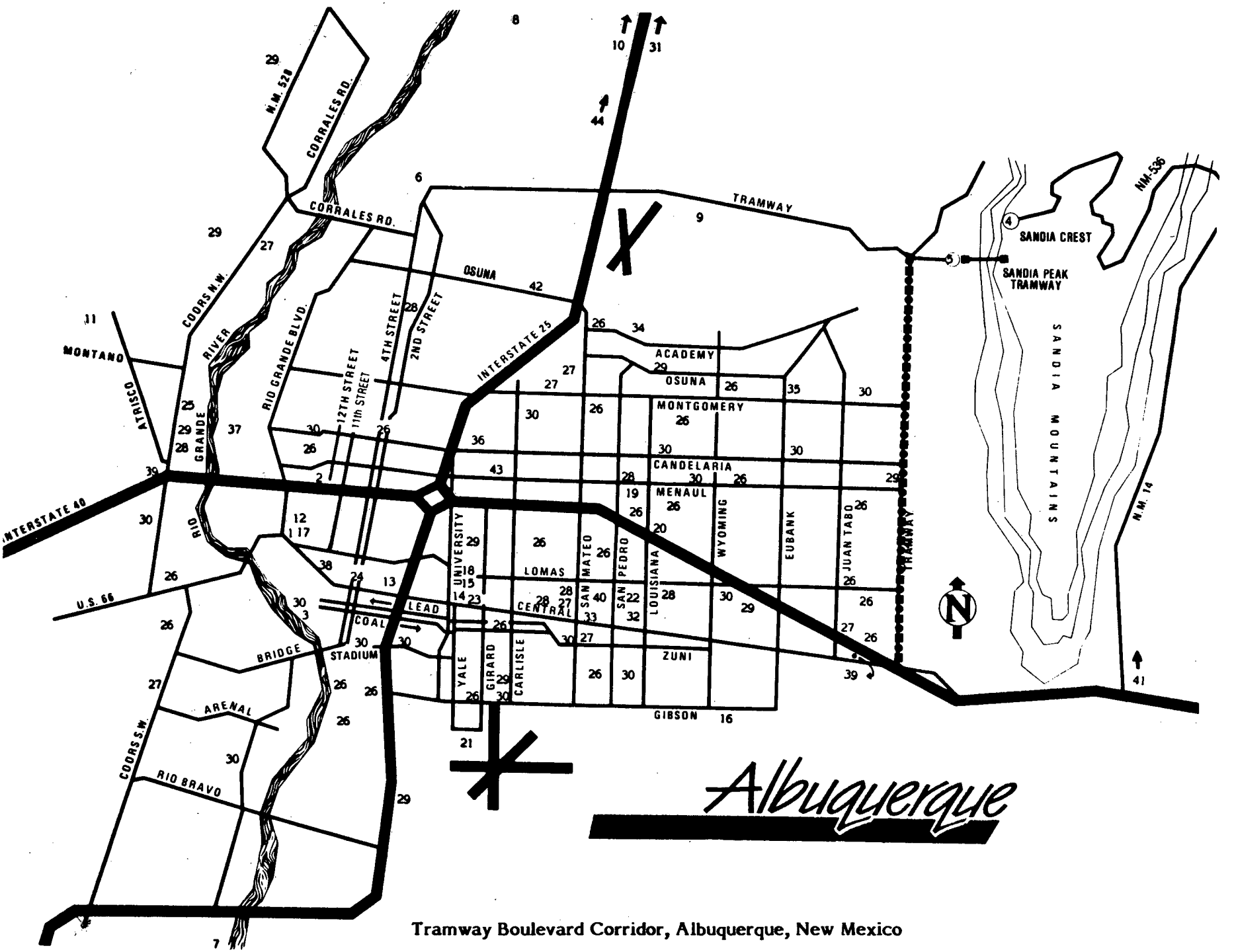
Level of use by pedestrians - poor; during a recent count taken at the overcrossings, 89 percent of pedestrians crossed at street level.

Accessibility - fair; one overpass requires pedestrians to step over a guard rail. Other overpass entrances are located along sidewalks elevated above street level. A worn foot trail indicates that pedestrians are walking along the street. These pedestrians most likely cross at street level rather than walking up to the overpass.

Continuity of path longitudinally - poor; there is no continuous pathways for pedestrians.

Continuity of path laterally - good; the overpasses provide safe crossing.

Pedestrian delay - moderate; in an effort to minimize the slope of the ramps, the overpasses have switchback ramps. These ramps increase the travel time for pedestrians.



Tramway Boulevard Corridor, Albuquerque, New Mexico

Level of pedestrian hazard - low; Tramway Boulevard is a high speed arterial. Those pedestrians who use the overpass can cross the highway safely.

Directness of pedestrian path - good; overpass entrances are located adjacent to the sidewalks. However, for those pedestrians who do not walk along the elevated sidewalks, the path is not direct.

Aesthetics and environmental quality - fair; these pedestrian facilities are more functional than aesthetically pleasing. There is no landscaping and litter is commonplace.

SUMMARY OF LESSONS LEARNED

The construction of Tramway Boulevard in Albuquerque has pointed to several lessons from which other communities may profit. First, it is usually easier from the points of view of both funding and implementation to construct major pedestrian facilities along with other major roadway facilities or land development. If there is resistance on the part of public agencies to provide pedestrian facilities, they are more likely to be built when a larger project is at stake. Although the ideal approach is to have the need for pedestrian facilities recognized at the outset and appropriate facilities included as part of the overall plan, resistance to providing the facilities can sometimes be overcome by making them part of a larger package. This may even slightly reduce total construction costs. If this is to occur, the community or someone within the public agency needs to become the pedestrian advocate, making sure that pedestrian safety and circulation are included as considerations in the planning process.

Careful design is also needed for the facilities, particularly pedestrian overpasses. Minor differences in the relative travel times between crossings at street level and via the overpass can often determine the extent to which the facility is used. Many pedestrians, particularly younger ones, have an inadequate perception of risk. Particularly in the case of younger pedestrians, making the crossings more attractive in terms of time will eventually have a safety payoff as well.

SKYLINE CENTER, FALLS CHURCH, VIRGINIA

SITE LOCATION AND BACKGROUND

Falls Church, Virginia is a suburb of Washington, D.C. Located approximately five miles from the center city, Falls Church encompasses a primarily residential but growing commercial area. Recent years have brought a surge in development of office space region wide, and a number of major activity centers. Skyline Center is one of these evolving activity centers.

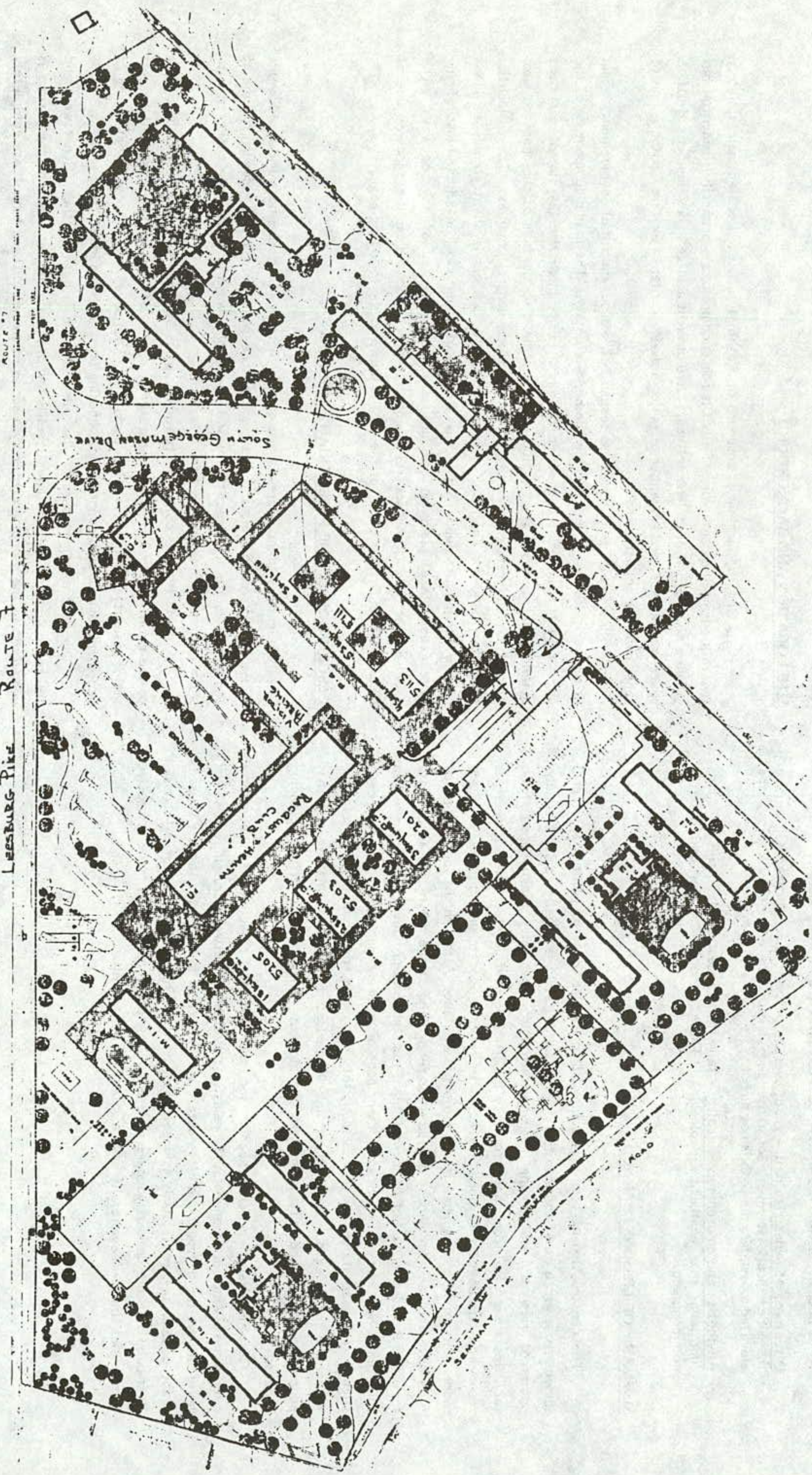
Skyline Center is a mixed use residential, office, and retail development, begun in the early 1970's and approaching the build-out stage. The major components of the site are the residential and office buildings. Eight high rise (26 story) apartment buildings and six multi-story office structures make up the bulk of the space on site. The office and retail development comprise one central complex. The residential towers surround it. The retail development includes a movie theater complex and a health/racquetball club. Skyline is a form of superblock, in which most of the development takes place on one large tract, not bisected by any roadways. The exception to this is the several residential towers located on the opposite side of George Mason Drive. A map of the area is shown of the following page.

DESCRIPTION OF THE PEDESTRIAN FACILITIES

While there is much open space on-site there is an existing network of sidewalks and access drives that allow pedestrians to access most of the site. However, some of the sidewalks are not direct routes and on-site walkways are not well-connected with those on the periphery of the site.

The site itself is split into two major parts by South George Mason Drive. Half of the residential buildings are separated from the office/retail development by this major facility (four lanes plus parking). The developer is now constructing a pedestrian overpass to connect these housing units with the main site.

One interesting feature of the site is the tie-in between the office towers and the retail center. At a building level below the main lobbies, each of the towers is connected to the shopping center by a series of tunnels. These tunnels are completely enclosed climate controlled corridors that also allow trips between the office buildings without stepping outside.


LEESBURG PIKE
ROUTE 7
SOUTH GEORGE MASON DRIVE
SEMINARY
ROAD

Part of the site has been dedicated as a four acre park area. The park is laced with pathways and there are some basketball courts and playground equipment as well. In addition, a smaller pedestrian area was provided on the top level of a parking deck. It included large trees, planted in mounts of dirt, benches, brick paving and bollards separating vehicular and pedestrian flow. The photographs on the following pages show some of the characteristics of the Skyline Center development.

IMPLEMENTATION AND FUNDING BACKGROUND

All improvements on the site were funded by the developer and were included as part of the master plan for the area submitted to the local government for review. Part of the pedestrian amenity package included a mini-park on the top floor of one of the parking decks, complete with trees, benches and special walkway paving. The pedestrian bridge was programmed for completion toward the final stage of development. The developer also paid for most of the off-site road improvements fronting on the site, including George Mason Drive and a major widening of Route 7.

EVALUATION OF THE FACILITIES

A major accomplishment of this plan is the integration of the office buildings with the shopping mall. The close proximity of the magnets and internal pedestrian provisions make walking the only realistic mode choice.

Although the residential buildings are also reasonably close, surveys indicated that some people still drive their cars from their residence to the shopping mall or office. George Mason Drive acts as a physical and psychological barrier between the major residential units and the office/retail complex. It would have been preferable to locate George Mason Drive on the far side of these buildings, eliminating the barrier completely. Access requirements and the nature of the surrounding street system precluded this, however. One of the positive elements of George Mason Drive was the inclusion of a median. This makes the crossing task noticeably easier, and many pedestrians take advantage of it by crossing one direction of traffic at a time. The overpass will at least give pedestrians the option of a grade-separated crossing. It is likely to be most useful to the less agile pedestrians. Skyline is an attractive location for the elderly, with essentially all necessary services a short walk away.

View of underground walkway system connecting the six office buildings with the retail mall.

View of plaza in front of Skyline Office towers.

Worn section of lawn showing pedestrian demand, but no facility.

Four acre park at Skyline site.

South George Mason Drive. Note construction of pedestrian bridge in the distance.

One of the major oversights along Route 7 was the omission of sidewalks on the south side. The need for sidewalks is clearly evidenced by a well-worn dirt path. It could have easily been included in the road improvements, but will now have to be built by the local government and may require an easement.

In spite of the land use intensity and proximity of uses, less than five percent of Skyline employees walk to work. It is also estimated that less than five percent of residents work within the Skyline complex. Although this percentage may increase as the development matures, the low walk trip percentage is probably a limitation of suburban origin-destination patterns. For shopping and personal business trips, Skyline offers substantial pedestrian convenience, and a large percentage of trips can be made by walking that would otherwise have to be made by car.

The following is a summary evaluation of the Skyline Center pedestrian facilities based on the defined set of criteria. For each criterion the first set of remarks refer to the office-mall pedestrian connections, and the second set address the rest of the facilities.

- level of use by pedestrians - 1) excellent; heaviest use at the lunch hour. 2) fair; use is relatively low.
- accessibility - 1) excellent; access is by elevator or ramp. 2) fair; some stairs and only a narrow walkway along a driveway.
- continuity of directional information for pedestrians - 1) good; signing and maps are provided. 2) fair; hard to tell how to get "there" from "here". Clearly marked pedestrian gateways would help.
- directness of pedestrian paths - 1) good; corridors do not allow for much deviation. 2) fair; many worn paths in lawns indicate pedestrians prefer other trip alignments. A sidewalk into shopping mall was retrofitted to accommodate one path.
- aesthetics and environmental quality - 1) good; pleasant atmosphere. 2) good; landscaping makes most outdoor areas pleasant.
- security - 1) good; areas are only open during the day. 2) good; no real problems.
- overall "friendliness" of pedestrian environment - 1) excellent; difficult to beat climate control for friendliness. 2) good; pleasant place to walk around.

SUMMARY OF LESSONS LEARNED

The experience with Skyline brings out several important points for pedestrian planning:

- High density land use and close spatial building relationships are vital ingredients for maximizing walking potential. A superblock, of which Skyline is a partial example, is generally a pedestrian-oriented development technique, but other constraints may limit its application.
- Structured parking is necessary to reduce the distances between buildings of the size contained in the Skyline development. In Skyline, structured parking was largely responsible for making the distances more walkable.
- If possible, major roadways should be brought around a major development and not through it. Where this cannot be done, the roadway should always be provided with a median or set of well-marked refuge islands. There should be no exceptions.
- Careful thought should be given to the safest and most convenient way to bring pedestrians in from the periphery of the site, particularly major sites such as Skyline. Plans sometimes tend to focus on internal circulation and ignore the site perimeter.
- Sidewalks should be constructed along with the construction of the internal and off-site roadway system. Adding sidewalks after the roadway system is built is more costly and often never occurs.

TOWN CENTER, COSTA MESA, CALIFORNIA

SITE TYPE AND LOCATION

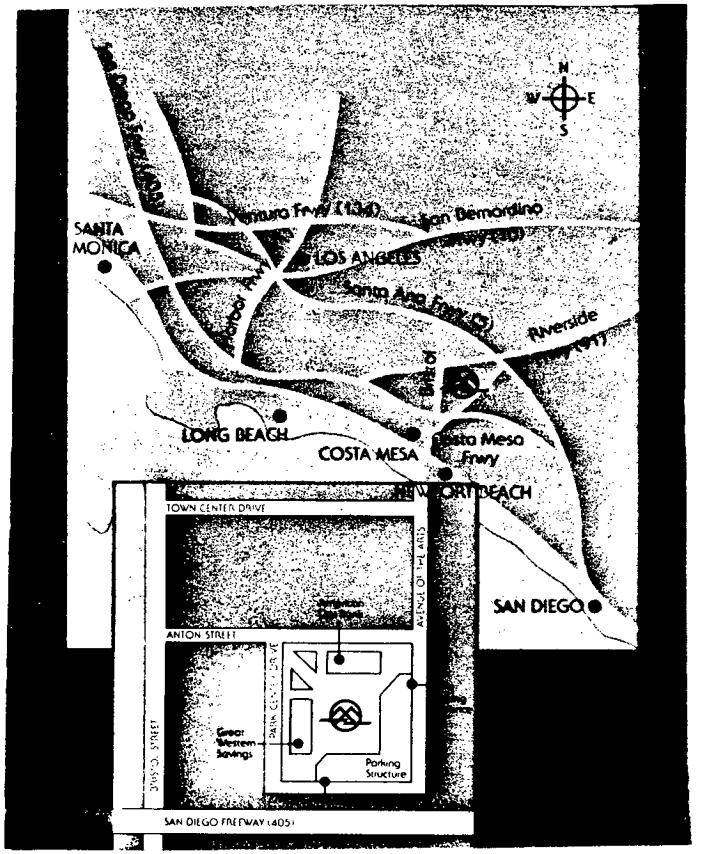
The City of Costa Mesa is located in Orange County, California, and lies approximately two miles from the Pacific Ocean (see figure). Town Center, located in northern Costa Mesa, is a mixed use development consisting largely of office uses. Most of the Center is already complete except for a few office buildings. The total development will be approximately three million square feet in size. Located in Town Center is a major hotel, several banks, a restaurant, a repertory theatre, a performing arts center and multiple movie theatres. Located to the east is South Coast Plaza, a major shopping mall. To the west, hotels, high density apartments, office buildings. A complex of apartments and townhouses surrounds Town Center. This entire development is referred to in this case study as the South Coast Complex.

DESCRIPTION OF STREET SYSTEM AND PEDESTRIAN FACILITIES

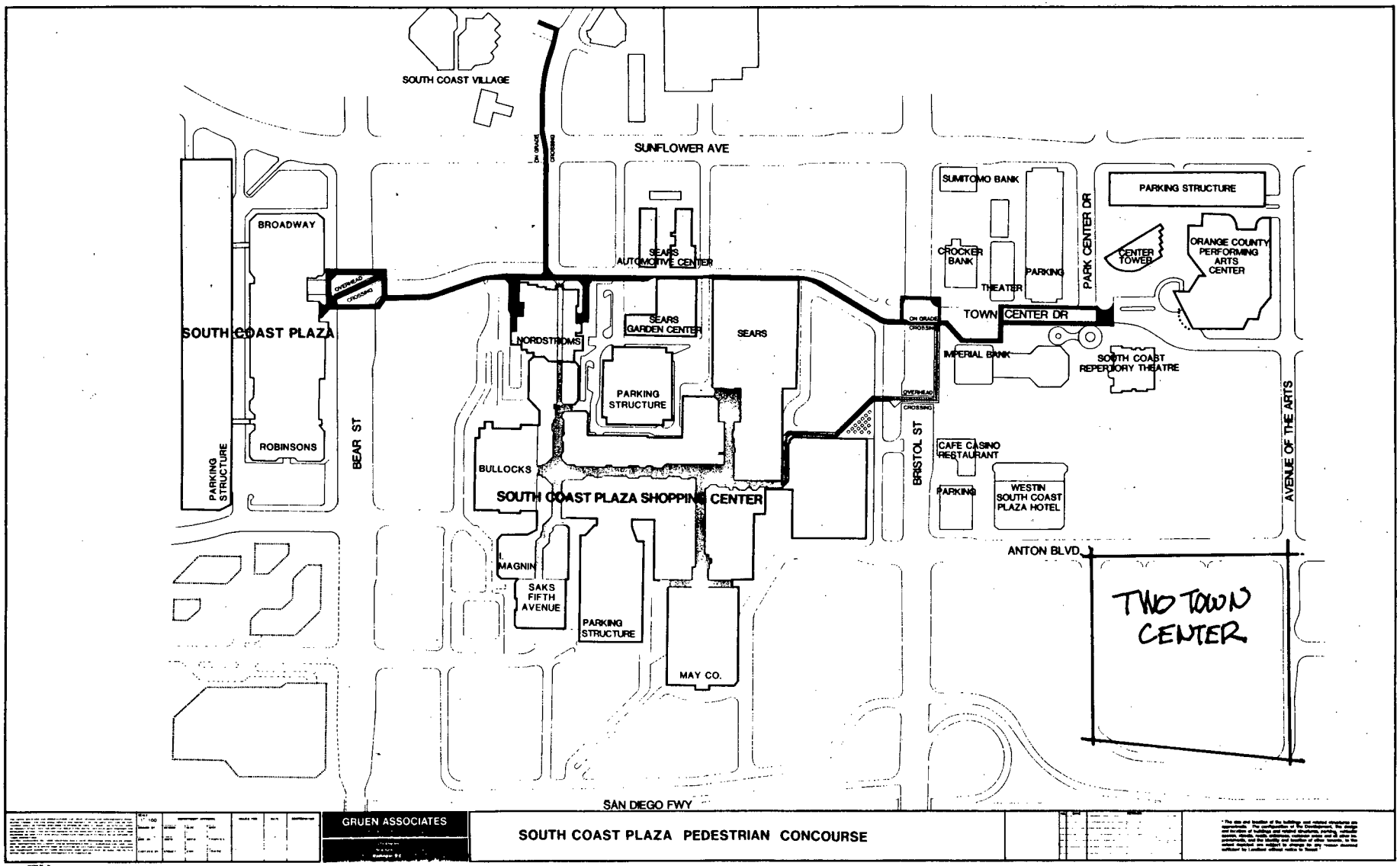
Town Center is located adjacent to the San Diego Freeway (Interstate 405). Bristol Street, a major north/south arterial, provides access to the site from the San Diego Freeway. Several four-lane streets pass through the site. Sunflower Avenue borders Town Center on the north, Avenue of the Arts on the east, and the San Diego Freeway on the south.

A pedestrian concourse providing pedestrian access from the shopping center to the office development is evolving into an elaborate sidewalk network. Of particular interest is the "California Scenario" sculpture gardens (see figure). Set in the courtyard of two high-rise buildings, the 1.6 acre garden creates an environment conducive to walking. The interconnecting concourse pathways weave throughout the Town Center development and ultimately lead to the Sculpture Gardens. The sidewalks are well landscaped and most are equipped with lights and street benches.

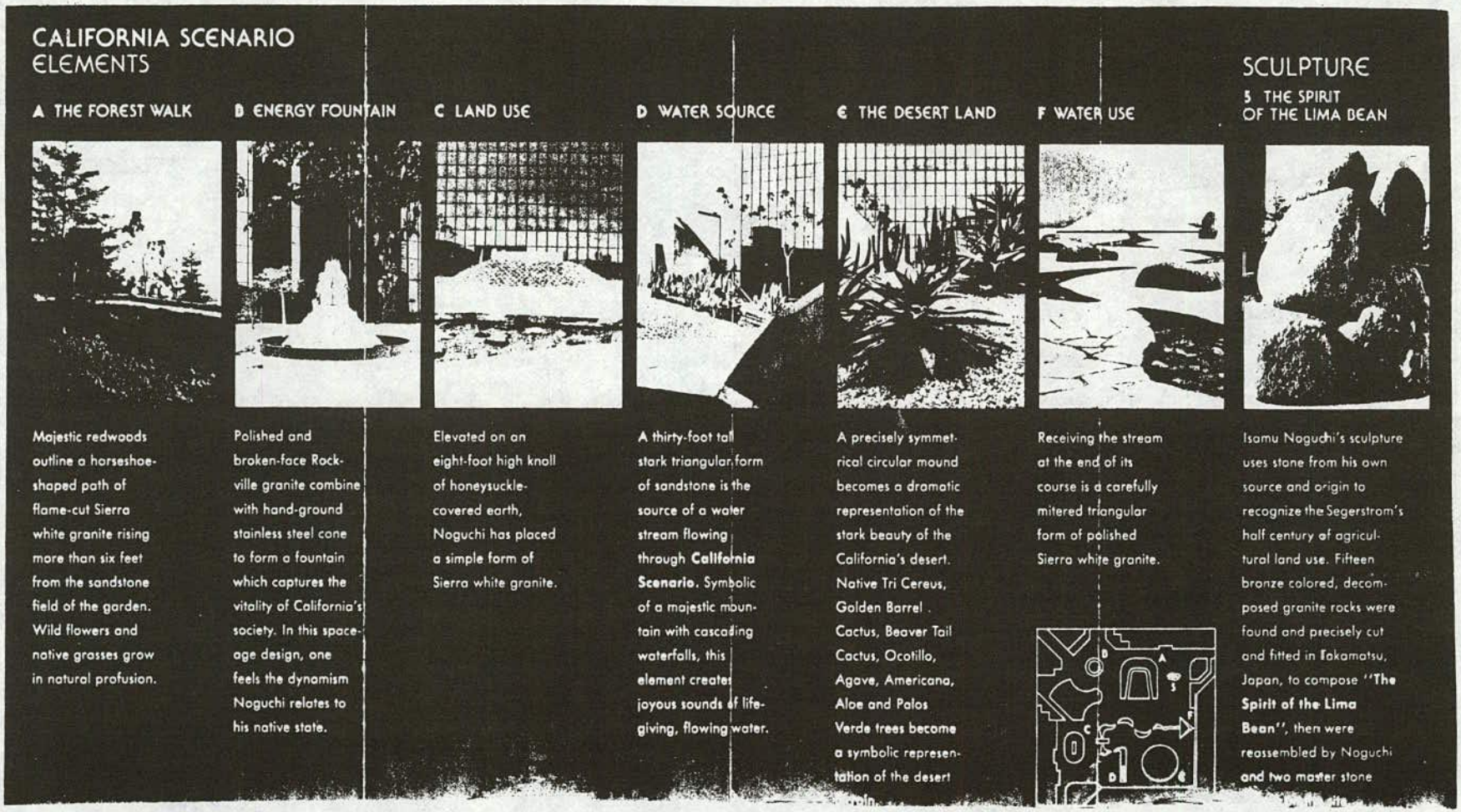
Bristol Street, a busy six-lane arterial separates the shopping center from the office/restaurant development. As a result of its width and popular attractions on either side, it is a potentially dangerous point of pedestrian/vehicular conflict.



Location of Town Center



Proximity of Town Center to South Coast Plaza Shopping Mall



Sample of "California Scenario" Sculpture Gardens

Currently, the developer operates a free shuttle bus service around the South Coast Complex. This shuttle provides a relatively direct route between the shopping center and the office development. Pedestrian bridges crossing Bristol Street and Bear Street (also a six-lane arterial) are in the proposal stage. Prior to these capital intensive improvements, crosswalks at the Bristol Street/Anton Boulevard intersection will be repaved with brick.

IMPLEMENTATION AND FUNDING

The pedestrian orientation of the South Coast Complex is fundamentally a result of developer initiative. The State of California (though the Environmental Impact Report process) is requiring the developer to construct a pedestrian bridge but, the City, itself has no requirements for pedestrian facilities. The developer has included a series of pedestrian amenities such as meandering walkways, landscaping and sidewalk benches out of a desire to create a park-like atmosphere.

Exactly when the pedestrian bridge is to be constructed is a matter of debate. The developer plans to build the bridge over Bristol Street when pedestrian use warrants it. It is the developer's point of view that pedestrian travel must intensify before the bridge is justified. The developer contends that many pedestrian bridges are considered useless and a waste of money because they are used so infrequently. The City is currently researching similar pedestrian bridges in an attempt to fully evaluate these issues of concern.

EVALUATION OF FACILITY

With little City initiation, it appears Town Center is well on its way to accommodating the pedestrian. Most development within the Town Center is connected by a well designed pedestrian network. The largest obstacle standing in the way of a complete pedestrian system is Bristol Street. Repaving the crosswalks may help, but the width of the street still makes crossing difficult. The shuttle bus provides an alternative means of travel, and may alleviate some of the problem but there did not appear to be any prominent notice that this service exists.

The following is an evaluation of the pedestrian facilities in Town Center based on the defined set of criteria:

- level of use by pedestrians - fair; pedestrian use was not high.
- accessibility - good; the sidewalk system is extensive and well linked with most development.
- continuity of path longitudinally - very good.
- continuity of path laterally - fair; crossing streets is hazardous because of their width and traffic congestion. More walk time at signals would help.
- pedestrian delay - severe; high; signal phases are long and pedestrians have a long wait time. Consequently, some pedestrians try to cross against traffic.
- clarity of directional information for pedestrians - good; most pedestrians know the safest place to cross.
- directness of pedestrian path - excellent; the pedestrian is given a variety of alternate paths to take.
- aesthetics and environmental quality - excellent; the open space and plentiful landscaping creates a relaxing environment conducive to walking. A survey of residents indicated that the scenery was the single most attractive feature of walking in the area.
- security - average; the security is no better or worse than any other suburban area. Fifty percent of survey respondents indicated that safety is good.
- overall "friendliness" of the pedestrian environment - good; the pedestrian system is continuous and well linked with developments.

SUMMARY OF LESSONS LEARNED

Town Center is slowly becoming a pedestrian oriented development. The pedestrian amenity package, including meandering walkways, landscaping, lighting and benches, is particularly attractive. Many of the improvements though, while aesthetically pleasing, are not addressing the problem of street crossing.

Further City initiative is needed to provide more effective pedestrian facilities. Discussions with both the City and the developer indicate that it is left to the developer's discretion when the pedestrian bridge will be constructed. Pedestrians will probably not use the walkways extensively until better connections are provided between generators.

DISNEY VILLAGE, ORLANDO, FLORIDA

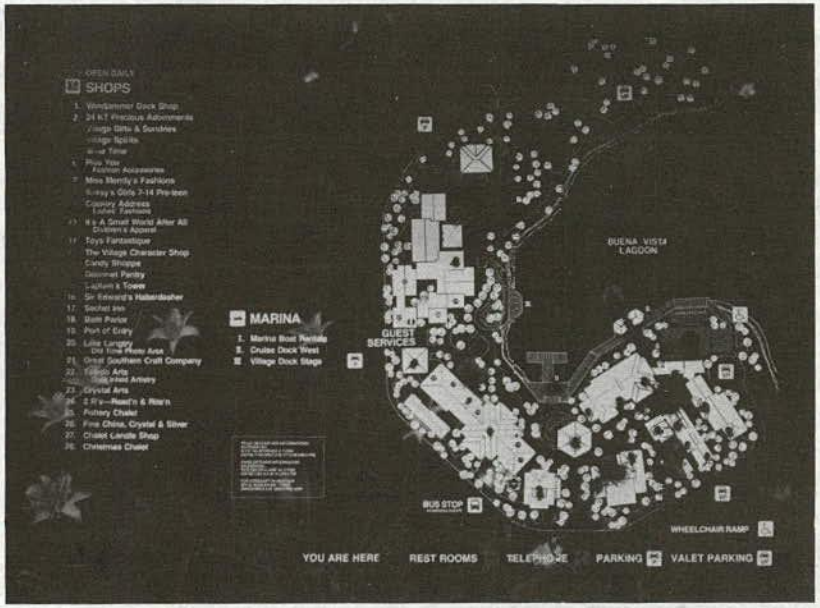
SITE TYPE AND LOCATION

Disney Village is a large mixed-use development located within the well known Walt Disney World complex in Orlando, Florida. It is a combination hotel, shopping center and office complex primarily serving tourists to Disney World. The central focus of the complex is a shopping center of approximately 200,000 square feet, containing mostly small shops and restaurants. Development was initiated in the early 1970s, along with the construction of Disney World itself. There are approximately 4,000 hotel rooms and 100,000 square feet of office space in the complex.

DESCRIPTION OF STREET SYSTEM AND PEDESTRIAN FACILITIES

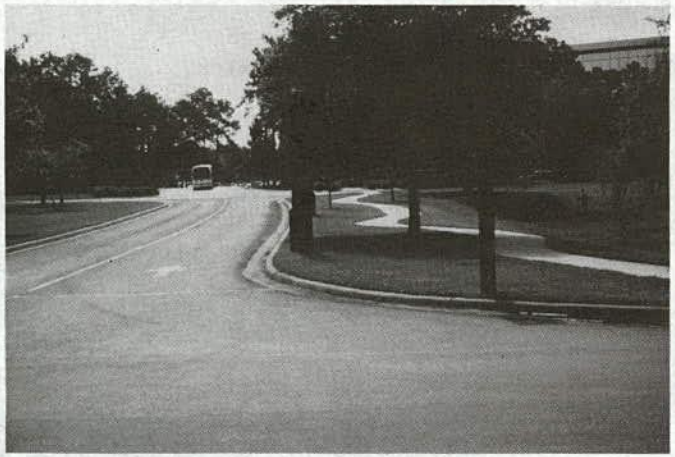
While the planning and implementation context of Disney Village is somewhat unique, it has aspects that are transferable to similar mixed use development elsewhere in the U.S. In a sense, the development of Disney Village was no different than any other major mixed-use development. Each individual parcel was developed under a long term lease agreement with Disney management, and a stringent set of design guidelines were established to guide development. The development of the master plan and design guidelines was made easier because of the incorporation of Disney World into an improvement district. The Reedy Creek Improvement District (R.C.I.D.) is a quasi-governmental agency but, limited in its powers (building codes, transportation systems, etc.). Other agencies (Orange County, South Florida Water Management District) still have basic controls. Except for this, however, there would be no reason that a similar development strategy could not be employed elsewhere.

Disney Village is most interesting for its planning and design aspects. The entire Disney World complex is much more pedestrian oriented than most other suburban areas, and efforts were made to design the pedestrian facilities as close to "ideal" as possible. The major roadways penetrating Disney Village are four-lane facilities with a median approximately 30 feet wide (see figure). These roadways intersect at the entrance to the shopping center, and traffic is controlled by a four-way stop. The multi-way stop was explicitly designed to better accommodate pedestrian crossings. A two-way stop would have been the conventional approach and would have facilitated



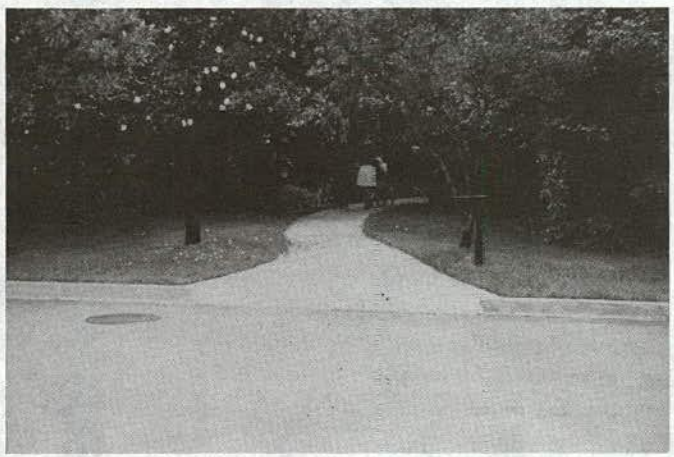
Information board showing plan of shopping center.

Roadway adjacent to shopping center. Note street-level sidewalk separated from road by bollards and pedestrian level lighting.



Meandering walkway looking away from shopping center.

Well-landscaped and channelized parking lot. Islands control traffic but allow for ease of pedestrian movement diagonally toward shopping center.



This walkway is a shortcut to a hotel just on the other side.

Vehicular approaches to crosswalks are identified by several advance signs.

Crosswalks are boldly marked.

traffic movement, but priority was explicitly placed on pedestrian safety and ease of movement. Intersection and mid-block crosswalks are boldly marked and signed, and special median crossings clearly delineate the route pedestrians are to follow. The pathway system is logical, providing reasonably direct connections from point to point. There are no dirt paths that indicate critical pedestrian links being left out.

Walkways are primarily located at the road edge, but set back significantly (often 20 feet or more) from the road. Sidewalks are concrete and meander through nicely landscaped borders, creating interest and amenity. Many walkways are provided with pedestrian level lighting, especially those that do not explicitly follow the roadway. Attention was paid to not only vehicular signing, but pedestrian signing as well. This was particularly important for Disney Village, since the vast majority of users were tourists, unfamiliar with the roadways and pedestrian system. In several places the walkway crosses a bridge or culvert, requiring the walkway to be brought alongside the road itself. At these locations, the walkway is separated from the road by a concrete barrier, protecting the pedestrian from traffic.

Parking lots are provided with ample landscaping and channelization, restricting vehicular speeds. No special walkways are provided from the parking lots to the buildings, but this is not seen to be a problem. Observations at other parking lots during the course of this study indicated that special pathways from cars to the building are typically not used.

The shopping center was developed in courtyard style, with parking on three sides and a lake on the fourth. There are four or five entry points to the shopping center from the parking lot, and a walkway is provided around the periphery of the center, channeling pedestrians to the entry points. This peripheral walkway is separated from the road by bollards, but is at the same level of the roadway. Maintenance of the facilities is, of course, meticulously done.

EVALUATION OF FACILITIES

With both the unique implementation situation and ample funding, one should have expected Disney Village to approach the ideal pedestrian environment. The development has certainly lived up to its potential. Although some might have argued that grade-separated pedestrian crossings should have been constructed, the existing

crossings are quite safe and blend in nicely with the total design. Overpasses probably would have been poorly utilized and difficult to blend into the environment. Underpasses would have been very expensive due to water table problems. The pedestrian facilities, based on the defined set of criteria would have to be rated excellent in virtually every category. Therefore, a point by point evaluation is not conducted here. Rather, some of the lessons learned that are transferable to other locations are highlighted in the following section.

LESSONS LEARNED

Even though other mixed-use developments, office parks and similar facilities may not have all the resources available to the same level of Disney Village, there are functionally many applications of the Disney Village experience. First, it is clear that conventional sidewalk can effectively accommodate most needs for pedestrian travel. The Disney Village sidewalk system satisfies most of the pedestrian travel needs. However, thought also needs to be given to other connections between facilities that do not necessarily run along the roadway. These additional routes can usually be identified once specific building locations are known. The entire pedestrian network can usually be conceptualized in a matter of only a few hours by a thoughtful planner. The proposed network should be incorporated into design documents at an early stage. The separation of the sidewalk from the roadway need not be as large as in Disney Village, but, if possible, should allow for some meandering to take the boredom out of the path. Usually, landscaping can not be as elaborate as in Disney Village either. However, judicious choice of landscaping materials and a reasonable amount of maintenance can make a great difference between a pleasant and unpleasant walking experience.

One of the other possible lessons is the potential for additional use of multi-way stops as an aid to pedestrian convenience and safety. Multi-way stops are generally frowned upon by traffic engineers as a speed control device, but probably have a legitimate place in facilitating pedestrian crossings. The most appropriate application is on internal street systems such as those in Disney Village.

APPENDIX C

WALK TRIP CHARACTERISTICS AND PEDESTRIAN ACCIDENT STATISTICS FOR SUBURBAN AND RURAL AREAS

This Appendix describes the nature of the suburban and rural pedestrian travel. It first addresses characteristics of suburban and rural pedestrian trip-making, followed by a discussion of pedestrian accident characteristics.

WALK TRIP CHARACTERISTICS

A review and compilation of data concerning walk trip characteristics was conducted to better quantify the amount and type of walking that occurs in suburban and developing rural areas. Existing data were supplemented with the residential surveys conducted in this study (see Appendix A for a list of sites and procedures).

General Characteristics

Walk trips can be classified into four basic trip purposes: work trips, school trips, trips for personal business (shopping, doctor, etc.), and recreational trips. The 1983-84 Nationwide Personal Transportation Study (NPTS) (1) compiled trip-making characteristics for all trip purposes and modes of travel, including walk trips. Table C-1 presents order-of-magnitude data on walk trip characteristics by purpose. The first column of data represents person-miles of pedestrian travel (PMT) per day in the U.S., in millions of miles (for persons 14 years of age and older). The walk trip data are probably under-reported, because it is difficult to effectively sample all walk trips in a general survey of this type. Most interesting is the percentage of PMT by purpose. Almost one third of pedestrian travel is to school or church, the bulk of this presumably being to school. If children under 14 had been included in the survey, the percentage of school trip PMT would have undoubtedly been much higher.

The large amount of walking between home and school points out the importance of paying careful attention to the home-to-school link in accommodating school age pedestrians, from both the safety and convenience perspective. Recreational walking is the next most significant trip purpose. Only about five percent of the miles were for commuting to work. Average walk trip lengths were just under one half mile and the average time taken to make a trip was 12.2 minutes. The following sections

Table C-1. Walk Trip Characteristics by Purpose*

	Daily pedestrian miles traveled in millions No. (%)	Average walk trip length (in miles)	Average trip time (in minutes)
To or From Work	.18 (5.0%)	0.3	8.6
Work Related	.23 (6.4%)	0.6	15.0
Shopping	.33 (9.2%)	0.2	10.1
Other Family or Personal Business	.19 (5.3%)	0.2	7.7
School/Church	1.15 (32%)	0.4	10.6
Doctor/Dentist	.20 (5.6%)	0.6	19.4
Vacation	0.02 (0.5%)	0.7	19.8
Visit Friends or Relatives	0.12 (3.4%)	0.1	7.2
Other Social or Recreational	.61 (17%)	0.5	11.8
Other	.54 (15%)	0.5	12.5
TOTAL	3.57 (100%)		

Source: 1983 - 1984 Nationwide Personal Transportation Study, November, 1985 (Reference 1)

present additional detail on walk trip characteristics for specific trip purposes, focusing on suburban travel, where data are available.

Work Trips

The 1977 Nationwide Personal Transportation Study (2) provides information on mode of travel characteristics for the U.S. population. The study indicates that between four and five percent of all trips to work are made entirely on foot. This is more than all transit modes combined, and represents some two million Americans walking to work. For those residing within the central city of SMSA's, 5.2 percent of the work trips are made by walking, compared with 3.8 percent of the work trips by suburban residents. The difference between urban and suburban percentages is probably attributable to differences in land use density and development patterns. Also, a lower percentage of residents in the central cities may have access to an automobile.

Outside SMSA's, walk trips comprise approximately 4.9 percent of all trips to work. This is almost as much as within central cities, probably reflecting the closer proximity of homes to places of employment in smaller towns.

Another way to look at the walk trip percentages is by city size. The walk trip percentages are as follows:

- Cities under 250,000 - 4.0 percent
- 250,000 - 500,000 - 2.9 percent
- 500,000 - 1,000,000 - 2.5 percent
- 1,000,000 - 3,000,000 - 5.2 percent
- over 3,000,000 - 6.2 percent

Being more suburban-like, the medium-sized cities appear to have the lowest walk trip percentage of all city sizes. They also have the highest proportion of work trips by auto. Again, land use patterns would probably be the most significant explanatory factor.

Table C-2 indicates walk trip length in comparison with trip lengths for other modes of travel. Interestingly, the suburbs, by far, have the longest trip length via walking of all four city categories. Whereas auto trip lengths are relatively stable among the city categories, ranging between 7.4 and 10.6 miles, walk trip length varies substantially, from the nearly one mile length in the suburbs of major cities to only 0.1 miles in small towns and rural areas. Some of the rural work trips could be as little as

Table C-2. Trip Length for Home-to-Work Trips by Mode

Mode‡	Place of Residence						
	Outside SMSA			Inside SMSA			
	Under 5000	Over 5000	Average	Not in Central City	Within Central City	Average	All
Auto	10.6	7.4	8.9	10.6	7.8	9.3	9.2
Truck/RV/Van	10.9	9.3	10.2	12.2	9.0	10.9	10.6
Motorcycle/ Moped	10.3	5.4	7.8	15.8	8.4	11.7	10.3
Bus	19.8	15.2	15.8	9.5	6.5	7.3	7.6
Train	63.2	44.2	59.0	28.5	13.8	22.7	24.2
Streetcar	5.0	—	5.0	4.9	4.0	4.2	4.3
Subway	15.0	—	15.0	12.3	9.3	9.7	9.7
Taxi (commercial use)	5.0	0.5	1.0	2.6	3.8	3.7	3.3
Bicycle	1.3	1.6	1.5	1.6	2.0	1.8	1.7
Walk	0.1	0.5	0.3	0.9	0.3	0.6	0.5
Other	12.9	59.4	35.0	78.0	84.8	79.7	64.4
Average Trip Length	10.2	7.6	8.9	10.9	7.6	9.3	9.2

† For all home-to-work person trips with distance known
‡ Auto includes: automobile, vanbus/minibus, and personal use taxi. Other includes: Airplane, school bus, and other.

Source: Reference 2

walking between the house and the barn next door. However, this again points out that the spatial arrangement of land use in the suburbs is not as conducive to walking as in other areas, requiring work trips to be longer and producing a lower percentage of walk trips than in other areas.

Of course, distance is not the only factor in making a determination of whether someone will walk to work. The convenience and safety of the route can be a significant influence, but the degree to which the route (as opposed to trip length) influences mode choice is difficult to determine.

The results of the residential community surveys conducted in this project were quite revealing of suburban commuting patterns (Table C-3). The planned communities, such as Columbia and Chesterbrook, had only a minimal percentage of residents walking to work, even though employment opportunities were available in each community. In the case of Chesterbrook, no respondents reported that they walked to work. The older communities surveyed, including Claremont, California, and the residential areas of Boston, had the highest percentage of walk trips to work, with Claremont far exceeding all other sites. Examination of the demographic data indicate that both areas had a generally older population base. The proximity of residences to the several colleges in Claremont is presumed to be the major reason for the high walk trip percentage there. In Chesterbrook and Columbia, the employment centers were relatively distant from much of the rest of the community, and the pathway system has little effect on enticing people to walk to work. Trip length data suggest that few of the residents of either community are employed in the community.

It is important to note that almost all trips, even auto trips, have a walking component. The walk component of a transit trip can be significant at one or both ends. The percentage of trips by transit varies widely within and among urban areas, from virtually none in some areas to 30 percent or more in the high-density corridors or subareas of some major cities.

Table C-3. Summary of Residential Survey Results of Work Trip Distance And Pedestrian Trips to Work

Location	Average Work Trip Distance (in miles)	Percent Persons That walk to work
Claremont, CA	9.5	22
Costa Mesa, CA	17.2	0
Arlington, VA	12.6	3
Burke, VA	14.5	0
Chesterbrook, PA	16.4	0
Boston, MASS	9.5	7
Columbia, MD	8.3	3

Source: Residential surveys conducted in this project (see Appendix A for procedures and sample sizes)

School Trips

Walk trips to school tend to be more frequent than for any other purpose, and trip lengths are generally longer than the average pedestrian trip, based on 1972 NPTS data (the most recent data of its type). Table C-4 depicts characteristics of walk trips to school. The data indicate that, when the data were collected, 87 percent of students that lived less than a mile away walked to school. Almost one-half of the

Table C-4. School Walk Trip Characteristics

Grade level and distance to school in miles	Percentage of students who walk classified by grade level and distance from home to school (all areas)	Percentage of students by distance from home to school		
		Residents of all areas and places	Residents of incorporated places	Residents of unincorporated places
Elementary				
Less than 1	87.5	45.2	58.2	23.6
1.0 to 1.9	46.1	17.6	19.8	13.8
2.0 to 2.9	11.2	12.4	10.1	16.3
3.0 and over	1.1	24.8	11.9	46.3
Total	49.3	100.0	100.0	100.0
Total number of students (000)		29,002	18,117	10,885
Intermediate				
Less than 1	90.5	26.3	37.2	8.4
1.0 to 1.9	63.4	18.9	23.4	11.6
2.0 to 2.9	32.5	17.6	18.5	16.2
3.0 and over	*	37.2	20.9	63.8
Total	41.6	100.0	100.0	100.0
Total number of students (000)		7,663	4,757	2,906
Senior				
Less than 1	80.9	16.6	22.7	7.1
1.0 to 1.9	47.5	16.6	21.8	8.3
2.0 to 2.9	17.7	19.8	20.2	19.1
3.0 and over	3.2	47.0	35.3	65.5
Total	26.4	100.0	100.0	100.0
Total number of students (000)		13,218	8,102	5,116
All grades				
Less than 1	87.0	34.7	45.7	16.8
1.0 to 1.9	49.3	17.5	20.9	12.0
2.0 to 2.9	17.3	15.2	14.0	17.0
3.0 and over	1.7	32.6	19.4	54.2
Total	42.0	100.0 1/	100.0	100.0
Total number of students (000)	____	49,883	30,976	18,907

1/ Includes only those for which distance information was available.

* Less than 0.1.

Source: Based upon unpublished Table E-2 from the Nationwide Personal Transportation Survey conducted by the Bureau of the Census for the Federal Highway Administration, 1969-1970.

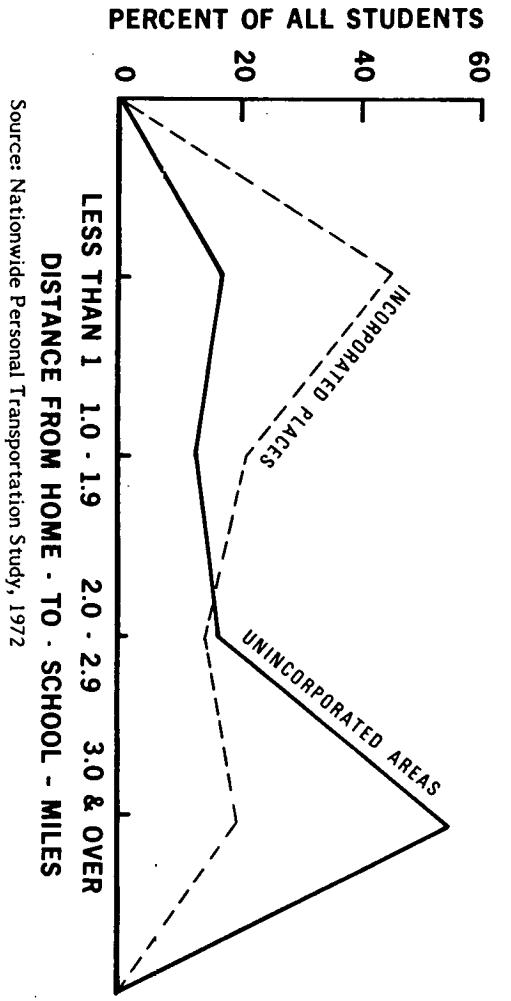
students surveyed who lived between one and two miles away walked to school. Table C-4 and Figure C-1 also show the distribution of distances from home to school, indicating the potential for walking. Almost half (46 percent) of students in incorporated areas live less than a mile away. In contrast, only 16 percent of students living in unincorporated areas live less than a mile away.

Substantial changes have taken place in land use and transportation since the early 1970's. Since the time of the NPTS survey represented in Table 2-4, substantially more students ride the bus to school. According to the Digest of Education Statistics, the percentage of students transported by bus has increased from approximately 43 percent in 1970 to 56 percent in 1980. This probably indicates that the percentage walking to school has decreased. The percentage in any one area is likely to vary widely, depending on proximity of homes to the school site, intervening barriers such as highways, and the economic character of the neighborhood.

Walking for Shopping and Personal Business Trips

Table C-5 presents the walk trip patterns for shopping and personal business trips from the residential surveys. The number of persons stating that they walked to the store, bank, or other places of business was consistently high, although the frequency of these trips varied substantially. The high percentage can be attributed to the locations selected for the surveys, all of which were within convenient walking distance of grocery stores, drug stores and other services. Locations remote from such services would obviously have a low walk trip percentage.

Recent studies of trip generation have examined characteristics of walk trips to shopping centers and retail uses. For typical suburban shopping centers, walk trips average approximately three percent of all person trips to the center. Regional malls in an area of largely single-family homes typically achieve one percent or less. Neighborhood shopping centers average more in the range of five percent. However, shopping centers located in close proximity to higher density residential development experience substantially higher percentages. For example, a study by the Urban Land Institute entitled Parking Requirements for Shopping Centers (3) reported that Brookvale Shopping Center in Fremont, California had nearly 16 percent of the patrons arriving on foot. This was reportedly due to numerous apartment complexes located in the immediate vicinity of the center, a city library adjacent to it, and nearby neighborhoods with good pedestrian access.



Source: Nationwide Personal Transportation Study, 1972

Figure C-1. Distribution of Distance Between Home and School

Table C-5. Walk Trip Characteristics For Personal Business

	Burke	Arlington	Claremont	Costa Mesa	Boston	Chesterbrook	Columbia
Walk for personal business?							
yes	77%	70%	92%	97%	77%	94%	67%
no	23	30	8	3	23	6	33
How often:							
5-7 days/week	0%	3%	10%	24%	15%	32%	7%
1-4 days/week	15	44	53	38	42	26	32
1-3 times/month	72	44	29	34	31	38	34
less than once/month	13	9	8	3	12	4	27
Distance typically walked (in miles)	0.8	0.7	1.0	0.7	0.8	0.9	*

*no information available

In suburban activity centers with mixed office and retail development, a large percentage of the trips to the retail facilities are on foot. For example, in studies for the Maryland-National Capital Park and Planning Commission in the Silver Spring, Maryland, business district (4), up to 90 percent of trips to certain retail facilities were walk trips. Table C-6 indicates the percentage of walk trips at selected retail sites in the Silver Spring, Maryland business district. The highest proportion of walk trips occur at convenience-type stores, such as drug stores and quick-service food stores. Speciality stores tended to have fewer walk trips, since they draw from a larger market area. For a department store in a suburban CBD with a substantial employment base, typically 60 percent of the mid-day trips would be on foot. These percentages will, of course, vary based on density and mix of uses.

Figure C-2 presents a cumulative distribution, by distance, of midday walking and driving trips from office buildings in developing suburban activity centers of Fairfax County, Virginia (see Appendix A for description of data collected). Trips include those originating at the indicated office building during the middle of the day. It indicates that most pedestrian trips from suburban office buildings tend to be short distances, with well over half being 0.1 mile or less. Approximately 95 percent of all trips on foot are less than one-half mile. Interestingly, the data shows that between one and eight percent of the auto trips from the office buildings were 0.1 mile or less. The lowest percentage of auto trips was at a planned mixed-use site, while the highest was Tyson's Corner, an area acknowledged by many to be a hostile pedestrian environment. On the average, 15 percent of all midday auto trips were within approximately one-half mile of the office. Because of time factors and habit, diverting a significant number of these auto-driver trips to the walk mode is likely to be difficult. Land use type and density appears to be the greatest influence on propensity for walking. As might have been expected, Fairfax County office buildings located in areas remote from other commercial uses had virtually no midday walk trips.

Table C-6. Percentage of Walk Trips at Selected Retail Sites in the Silver Spring, Maryland Business District

Site	% Pedestrian Trips 7 - 9 AM	11 AM - 1 PM	4 - 6 PM
Bank w/drive in	100	61	37
Jewelry store	-	79	77
Music store	-	32	17
Drug store (in commercial core)	16	89	83
Drug store (shopping center)	31	36	30
Appliance store	-	68	73
Grocery store	-	55	65
Shoe store	-	88	61
Department store	-	67	53
Quick-service food store (in shopping center)	18	43	43
Quick-service food store (in residential towers)	5	90	85
Hardware store	-	41	53
Optician	-	68	72
Printing shop	-	44	50
Shopping plaza in mixed use development	35	72	85

Source: Surveys in the Silver Spring, Maryland business district by JHK & Associates, 1978.

Recreational Walking

Recreational walking is becoming increasingly popular as the American public's interest in good health and physical fitness continues. Americans are beginning to recognize the physical and psychological benefits to be gained from walking. Doctors and physical fitness experts have long advocated walking for health reasons. Each

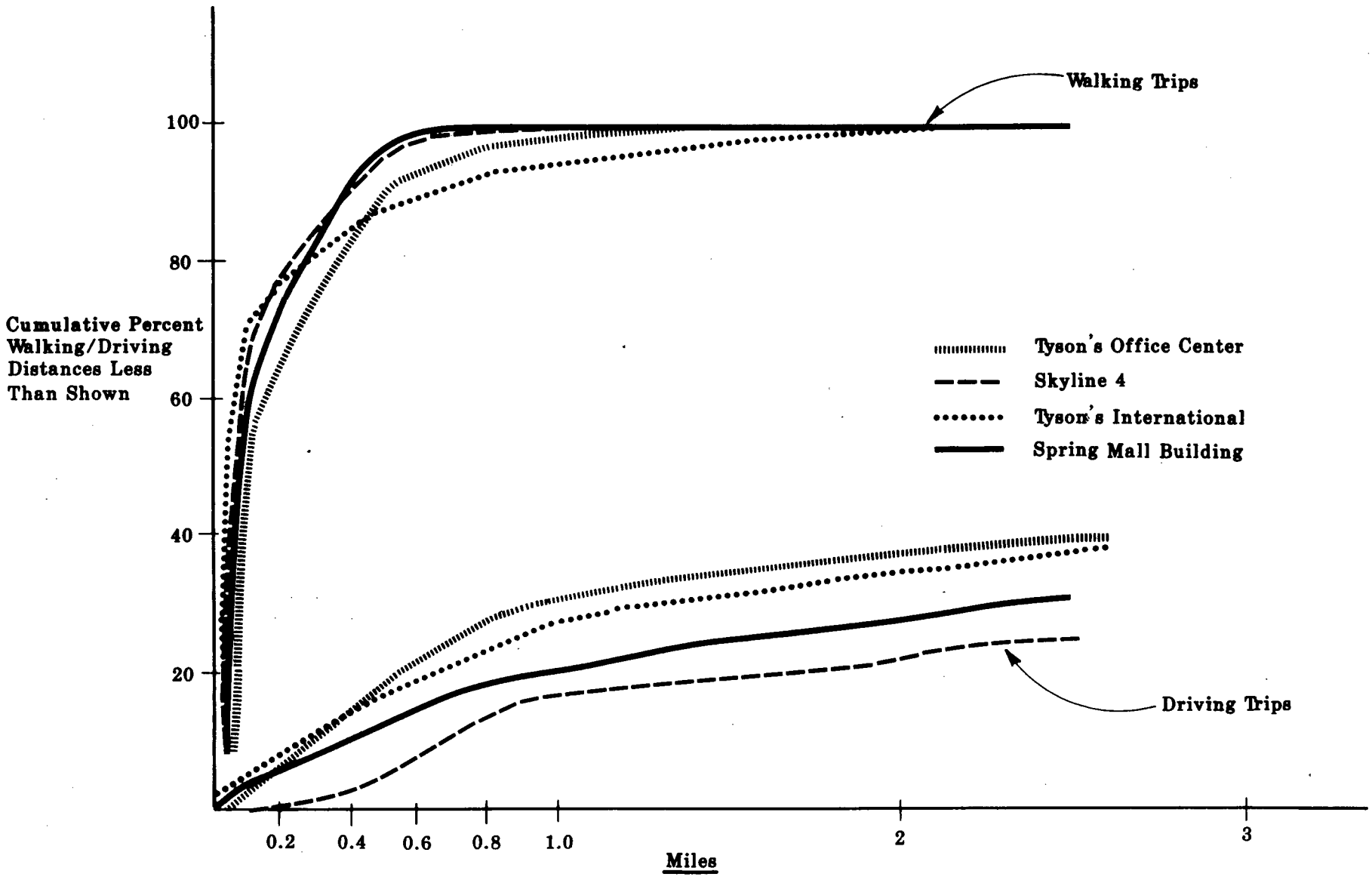


Figure C-2. Cumulative Distribution of Trip Distance for Midday Walking and Driving Trips from Office Buildings in Suburban Activity Centers

Source: Workplace surveys by JHK & Associates, in Northern Virginia, Fall, 1985

year, more than a million Americans suffer heart attacks. About 400,000 people survive and nearly all enroll in cardiac rehabilitation programs featuring walking. The popularity of walking as a recreational sport is evident by the growing number of participants. In a survey conducted by the National Park Service (see Table C-7), 53 percent of United States residents surveyed said they walk for pleasure (at least once in last 12 months). The popularity of walking extends across all demographic categories, with no less than 35 percent participating even in the most disadvantaged categories. Older respondents (over age 60) also walk for recreation far more than they participate in any other recreational activity. Other interesting survey results, conducted by the Walkways Center (6), indicate that 33 percent of its new members walk at least three days per week and 59 percent walk daily. Thirty-six percent walk approximately two miles per trip and 54 percent walk three or more miles.

Table C-8 summarizes the results of the residential survey data relating to recreational walking and jogging. Findings show that 88 percent of the respondents walk for exercise or recreational purposes. More than a quarter of residents surveyed walk five to seven days per week, while another 40 percent walk one to four days per week. On the average, residents walk approximately two miles per trip. It is interesting to note that the planned communities (Chesterbrook and Columbia) had the lowest frequency of recreational walking (in terms of the number of days per week or month) of any of the communities. It may be noteworthy that Columbia residents also had the greatest perception of security and crime problems.

While not as prevalent as walking, 30 percent of surveyed residents reported regular or occasional jogging. Forty-four percent of joggers run one to four days per week. On the average they run just over two miles per trip. The largest proportion of joggers (42 percent) run on special pathways, but the percentage varies among communities, depending on pathway availability. Thirty-eight percent run on sidewalks near their homes and 22 percent run on roads near their homes.

Propensity for Increasing Walking Through Land Use Changes and Provision of Pedestrian Facilities

A major survey of motorized and non-motorized travel conducted for the Office of the Secretary of Transportation (5) examined existing walk trip characteristics in five cities and evaluated ways to increase the walking mode share. Sampling areas included portions of Austin, Texas; Columbus, Indiana; Denver, Colorado; Huntington Beach, California; and Philadelphia, Pennsylvania. The percentage of trips via the walk mode were consistently higher for personal business trips as compared to work trips. The percentage of personal business trips via walking ranged from approximately 60 percent in central city Philadelphia to six percent in Huntington Beach, a classic suburban setting. Ten to 20 percent was a common value for the other areas.

The study also examined the potential for increasing the percent of trips made by walking by posing hypothetical scenarios to the survey respondents. The respondents were asked to determine if they would walk for either their work trip or personal business trip if one of the following conditions existed: a compact land use, imposition of a congestion fee, fuel price increases, improved pedestrian facilities, and improved bicycle facilities. The scenarios were very specific so that each respondent could more clearly evaluate what mode would be selected under the stated conditions. Compact land use had the greatest effect on walk trip potential, with the potential of tripling the percentage of work trips by walking and doubling the percentage of personal business trips. This finding seems to verify the observation made in preceding sections that land use density is one of the primary determinants of walk trip potential. It also suggests that, not only is the spatial arrangement of land uses an important determinant in pedestrian planning, but that particular attention needs to be paid to pedestrian facilities in those suburban and developing rural areas which have development settings conducive to walking.

The scenario involving improved pedestrian facilities also had a significant effect on the mode of travel respondents said they would use, but not nearly as significant an effect as compact land use. Respondents were directed to select a mode of travel assuming the following scenario.

> "Suppose the city introduces several improvements to pedestrian-related facilities designed to increase the comfort and safety of pedestrians. The improvements consist of (a) providing pedestrian pathways, (b) improving sidewalks, (c) providing better lighting, and (d) making traffic signals more pedestrian-oriented. Separate pedestrianways or walkways are built adjacent to all major roadways. These pathways are separated from automobile traffic by trees or a grass median. At all busy street crossings, pedestrians will be able to change traffic lights in their favor. All existing sidewalks are repaired to make walking easier. High-intensity lights are added along the pathways to provide excellent visibility at night. Finally, the walkways are enhanced by the presence of water fountains, shade trees, benches, and pedestrian-oriented stands with flowers, newspapers, and refreshments."

Table C-7. Walking for Recreation or Exercise

	Walking for Pleasure	Running or Jogging	Day Hiking	Bicycling
Percentage of total sample who said they participated at least once in prior 12 months	53	26	14	32
By age: 12-24	57	51	19	55
25-39	58	31	17	37
40-59	53	13	12	22
60+	42	2	5	7
By sex: Male	45	30	15	33
Female	61	23	13	32
By education:				
Less than high school	35	6	3	11
High school but less than 4 years of college	56	20	13	28
4 or more years of college	67	34	25	37
By race: White	54	26	15	33
Black	49	30	3	29
By income: under 5,000	45	21	10	23
5,000 - 14,999	46	20	10	24
15,000 - 24,999	54	27	13	35
25,000 - 49,999	61	33	18	41
50,000 and over	62	37	25	42
Average number of days of participation per participant per month during season prior to interview				
Spring			1.0	3.4
Summer	-	-	1.3	4.2
Fall			0.8	2.5
Winter			0.7	2.0
Percentage of participants who said they particularly enjoyed the activity	17	19	37	30
Implicit number of participants in the U.S. population 12 years old or older (millions)	100	49	26	61
Respondents who said they started or stopped participating during the past two years prior to interview or who said they expect to start participating in the next two years (as a percentage of current participants--first column)				
Percentage who started activity in prior two years	-	-	10	5
Percentage who said they stopped activity in prior two years	1	5	3	5
Percentage who said they expect to start activity in next two years	1	6	9	3

Source: Adapted from VanHorne, Merle J., Laura B. Sywak, and Sharon A. Randall, Outdoor Recreation Activity Trends--Insights from the 1982-83 Nationwide Recreation Survey, Wash., D.C., National Park Service, 1985.

Table C-8. Percent Walking/Jogging For Recreation

	Burke	Arlington	Claremont	Costa Mesa	Boston	Chesterbrook	Columbia
WALK							
Walk for exercise or recreation?							
no	14	16	11	13	22	3	18
yes	86	89	89	87	78	97	82
How often:							
5-7 days/week	34	32	33	31	25	10	22
1-4 days/week	47	28	48	50	41	38	33
1-3 times/month	9	40	16	15	25	47	28
less than once per month	9	0	3	4	9	5	17
How far: (in miles)	1.6	2.0	2.3	2.3	1.7	3.2	2.0
JOG							
Run or jog for exercise?							
no	77	63	65	67	81	61	67
yes	23	37	35	33	19	39	33
How often:							
5-7 days/week	24	13	12	19	0	0	11
1-4 days/week	44	25	64	36	72	22	39
1-3 times/month	19	62	15	36	14	37	39
less than once per month	13	0	9	9	14	42	11
How far:	2.8	2.5	2.3	2.3	2.2	2.7	2.0
Where do you typically jog:							
sidewalk near home	14	38	30	60	58	67	26
road near home	26	22	45	10	14	40	13
special pathway	46	100	22	20	14	53	43
track nearby	0	-	0	-	-	-	4
near office	14	-	0	-	14	-	4
other	0	-	3	0	-	-	9

NOTE: Some numbers may sum to more than 100 percent.

Source: Residential surveys conducted in this project.

On the average, results indicated that this ideal pedestrian setting would nearly double the current walk trip percentage. However, the effect varies significantly by type of area. In Huntington Beach, the most suburban of these sites, the results indicated that only about five percent of the automobile trips would shift to walking. Although the scenarios tested were purely hypothetical, the results of the study do indicate that improved pedestrian facilities, even in suburban areas, have the potential for effecting at least some diversion of trips to walking from the automobile. Areas with adverse climates would, of course, be more difficult settings in which to achieve these diversions. Weather is clearly a major factor in the propensity for walking.

Future Walking Trends

Demographic and travel characteristics indicate that the number of walkers is growing. Demographic projections also indicate a gradual aging of the U.S. population. This trend will encompass both the central city and the suburbs. Senior citizens tend to be more dependent on walking for utilitarian purposes, and often locate in areas convenient to services specifically for that purpose. A survey by the Walkways Center (6) indicates that its new members are predominantly 40 to 60 years old.

The increase in walking trends is further substantiated by the multitude of newly initiated and growing walking-related organizations and activities. Several non-profit organizations and associations have been established to promote walking. These associations disseminate pertinent walking information through periodic newsletters. Some of the issues addressed include health and fitness information, walkers networks, and walking trips organized on a local, national and international level.

Activities such as race walking and volksmarching are also on the increase. Racewalking, a fast paced, vigorous form of walking, has been an Olympic sport since 1908. It has been gaining popularity because it improves physical fitness without the risk of the many injuries caused by jogging. Volksmarching, a non-competitive, non-timed people's walk, was begun in Germany in the 1960's. Designed to get people out of their cars for a day of walking, Volksmarching has become increasingly popular in the United States.

Another indication of the increase in walking is the consumer demand for walking shoes. There is a growing trend toward lightweight, comfortable shoes designed specifically for walking. One prominent walking shoe company has recently opened five new factories to meet consumer demand.

Suburban Pedestrian Perceptions and Expectations

The survey of residential communities conducted in this project examined the walking habits of residents and their attitudes toward walking facilities. Residents were asked what they particularly like and dislike about walking in their communities. The results are shown in Table C-9. In every community surveyed, respondents indicated that the scenery and aesthetics of the area made walking particularly enjoyable. Residents also cited the advantages of the walkway systems that interconnect areas and activities.

The most prevalent complaints by residents were associated with traffic, including the conflicts, noise and pollutants usually associated with it. Pedestrians feel threatened by traffic especially in higher density areas. Also, respondents would like to see more crosswalks, additional stop signs and/or traffic signals and better traffic enforcement. There is an apparent perception that crosswalks inherently improve street crossing safety for pedestrians. There has yet to be any conclusive evidence of this in the reseach, however, and some studies have indicated higher accident potential at marked crosswalk locations (7).

Security is another area of concern that consistently surfaced in the surveys. Residents feel uneasy walking alone or at night along secluded pathways. Many respondents indicated they would feel safer if sidewalks or pathways were well lit.

The statistics presented in the above sections clearly indicate that walking is very much a part of our everyday lives, perhaps much more than we realize, even in suburban areas. Although the automobile is still the dominant mode of travel, walking is usually much more significant than any of the remaining modes. While walking is concentrated near major activity centers, it can occur almost anywhere, even in places where a particularly heavy demand might not be expected. The many worn footpaths evident along major highways and other areas attest to the fact that pedestrians are there.

SUBURBAN AND RURAL PEDESTRIAN ACCIDENT CHARACTERISTICS

Pedestrians are involved in a relatively large number of accidents in suburban and developing rural locations. The proper design and development of facilities in these areas can greatly reduce the threat to pedestrians. This section will describe the nature and extent of the rural and suburban pedestrian safety problem. Armed

Table C-9. Pedestrian Perceptions and Expectations

	Percent of All Respondents Commenting						
	Burke Residents	Arlington Residents	Claremont Residents	Costa Mesa Residents	Boston Residents	Chesterbrook Residents	Columbia Residents
Specific likes:							
friendly neighbors	0	6	45	-	3	-	2
stores nearby	2	6	2	24	5	-	3
nice scenery	84	3	48	28	24	56	33
exercise/fresh air	7	15	8	3	3	15	-
safe, pleasant area	7	3	6	17	24	6	-
space for recreation	3	6	-	3	-	26	-
local paths/side-walk, parks	-	24	6	-	-	-	27
Specific dislikes:							
litter/graffiti/dogs	5	18	4	-	3	-	8
traffic	67	30	11	41	24	15	5
lacking sidewalks	5	6	12	21	11	50	19
not enough crosswalks	-	-	-	7	5	-	-
not enough trees/scenery	-	9	-	3	-	-	-
lacking street lights	16	-	18	-	3	-	18
air pollution	-	3	-	-	-	-	-
security problems	6	27	4	17	2	8	40
Suggestions for improvement:							
snow plowing	-	-	-		3	-	-
more/fix sidewalks	47	3	21	21	16	56	6
traffic enforcement/ police patrol	-	30	3	24	3	6	5
more crosswalks	-	-	-	-	14	-	-
more one-way streets	-	-	-	3		-	-
pave roads	-	-	-	-	3	-	-
better lighting	16	21	22	7	5	-	24
longer time for walk signals	11	-	7	7		6	-

NOTE: Numbers will not sum to 100 percent.

Source: Residential surveys conducted in this project.

with an awareness of the problem, the designer should be able to avoid, or at least reduce, potentially hazardous situations.

Each year pedestrians account for about one out of every six motor vehicle fatalities that occur in the country, and about one out of every 33 injuries. More than one third of the pedestrian fatalities, about 3,500 pedestrians annually, occur in rural areas. Between 10,000 and 12,000 pedestrians are injured each year in rural areas. Pedestrian accidents in rural areas tend to be relatively serious. Unfortunately, lacking a clear definition of urban versus suburban, the number of pedestrian accidents occurring in suburban locations cannot be precisely determined. What is known is that many of the some 4,600 pedestrians killed and many of the 120,000 injured each year in areas classified as urban actually could be considered as suburban pedestrian casualties, but the exact number of suburban pedestrian casualties is not known.

In order to identify additional characteristics of the rural pedestrian accident problem, data from several sources were obtained. The National Accident Sampling System (NASS) and the Fatal Accident Reporting System (FARS) are national data bases maintained by NHTSA. Both accident systems classify their accidents by "land use" - urban or rural. Classifications used are those of the Federal Highway Administration. Special crosstabulations were obtained to identify potentially relevant factors. In addition, several additional references were found to contain accident information specific to suburban and rural areas (8 and 9). The data presented below are based primarily on Reference 8.

Site Factors

Rural pedestrian accidents are almost evenly divided between local streets (33 percent), minor arterials (30 percent), and major arterials (36 percent). Urban pedestrian accidents are similarly distributed between local streets (36 percent), major arterials (27 percent), and minor arterials/urban collectors (35 percent). Although these urban and rural distributions of roadway functional classification are remarkably similar, the roadways are far less similar in terms of cross-section. While 95 percent of the rural accidents occurred on two-lane roadways, only 62 percent of the urban pedestrians were struck on roadways with only two lanes. Not surprisingly, most pedestrian accidents occur on roadways with a 30 to 40 mph posted speed limit (52 percent). While 39 percent occur on roads with a 25 mph limit only 9 percent occur where the speed limit is posted at 45 mph or higher. About 8 percent of the urban pedestrian accidents occur at locations with a curbed median and another 5 percent occur at locations with a painted or unprotected median.

The rural and suburban accidents tend to occur mostly in residential (51 percent) and commercial (26 percent) areas. Only 16 percent occurred in areas which were considered to be "open" or undeveloped.

Most urban pedestrian accidents involve pedestrians crossing the roadway, either at an intersection (31 percent) or midblock (40 percent). Rural and suburban accidents involve less crossing at intersections (16 percent) and less crossing midblock (35 percent). Many more rural and suburban pedestrians are being struck while walking along the roadway either with (10 percent) or against (four percent) traffic, or while just standing in the roadway (seven percent).

Accident Factors

It has long been recognized that pedestrian accidents typically occur most frequently in the late afternoon and early evening. As shown in Table C-10, rural and suburban pedestrian accidents tend to have a similar pattern.

Slightly more rural and suburban accidents tend to occur in the late evening and early morning hours. In fact, fully 33 percent occurred after dark. Only six percent of the accidents occurred at locations that were well-lighted. Weather and road surface condition does not appear to be a major factor. Like urban pedestrian accidents most (92 percent) rural and suburban accidents occur when it is clear or cloudy, only four percent occurred when it was raining and two percent when it was snowing.

Pedestrian Characteristics

The urban pedestrian accident problem has typically involved the very young and the very old. The rural and suburban pedestrian also tends to be relatively young but in these areas not as many older pedestrians are being struck. Although 19 percent of the urban pedestrians struck were over 65, only six percent of the rural and suburban pedestrians were that age. This can probably be attributed to demographic patterns, particularly trends in residential location. Older citizens tend to locate in denser settings, closer to needed services. As shown in Table C-11 the rural and suburban pedestrian accidents also tend to include more teenagers and young adults. There are also slightly more males involved in suburban and rural accidents (68 percent) than

Table C-10. Percent Distribution of Pedestrian Accidents by Time of Day

Time of Day	Rural & Suburban %	Urban %
12:00 - 01:59 A.M.	4	3
02:00 - 03:59 A.M.	3	2
04:00 - 05:59 A.M.	1	1
06:00 - 07:59 A.M.	5	4
08:00 - 09:55 A.M.	5	7
10:00 - 11:59 A.M.	5	7
12:00 - 1:59 P.M.	9	10
02:00 - 3:59 P.M.	15	18
04:00 - 5:59 P.M.	18	19
06:00 - 7:59 P.M.	16	15
08:00 - 9:59 P.M.	10	9
10:00 - 11:59 P.M.	8	5
TOTAL	100	100

Source: Reference 8.

Table C-11. Distribution by Pedestrian Age and Sex

Pedestrian Age	Rural & Suburban %	Urban %
0-4	12	9
5-9	20	21
10-14	14	11
15-19	15	8
20-24	9	6
25-29	5	5
30-34	4	3
35-39	3	3
40-44	3	2
45-49	2	3
50-54	2	4
55-59	3	3
60-64	2	3
65+	6	19
TOTAL	100	100

Pedestrian Sex	Rural, %	Urban, %
Male	68	61
Female	32	38
Not Stated	0	1
TOTAL	100	100

Source: Based on data from 3,827 accidents from six cities, 1973 and 1974.

there are in urban accidents (61 percent). Also, more than 10 percent of the pedestrians in rural and suburban areas were under the influence of alcohol or drugs. Driver alcohol/drug impairment was noted in seven percent of the accidents.

Collision Characteristics

Most of the pedestrians who are struck (41 percent) were running just prior to the collision. Although about 30 percent were walking, more than 16 percent were not moving immediately prior to the accident. Although most of the accidents occurred on the roadway, only five percent occurred in a marked crosswalk. Of those accidents that did not occur on the roadway most occurred either in a parking lot or private driveway (three percent) or on the sidewalk (one percent) or a curb or gutter (one percent) or in a yard or field (one percent). About nine percent of the accidents occurred on the shoulder of the roadway.

Although nearly half (47 percent) of the drivers were looking at the pedestrian immediately prior to the collision, only 21 percent of the pedestrians were attending to the collision vehicle. More than half (53 percent) of the pedestrians were unaware of the impending collision. About 13 percent of the pedestrians walked or ran into the collision vehicle.

Causal Factors

A number of factors have been identified as having acted in a causal (precipitating) or related (predisposing) element in the rural and suburban pedestrian accidents. These factors have been classified as course (risk-taking) failures, search failures, detection (perceptual interference) failures, evaluation failures and avoidance action failures. Precipitating and predisposing factors have been assigned to both the driver and the pedestrian.

Pedestrian course (risk-taking) failure was the most frequently identified factor. In 70.2 percent of the cases a pedestrian course failure was identified as a causal factor. In 53.8 percent such a failure was identified as a related factor. Running (37.4 percent), short-time exposure (30.5 percent) and high exposure to vehicles (25.1 percent) were the most frequently identified pedestrian course failures. Walking along the roadway, on the wrong side (i.e., with traffic) was found in a total of 8.2 percent of the cases.

Pedestrian search failures were identified as causal factors in 57.2 percent of the cases and as predisposing factors in 27.2 percent. The most common search failures included inattention (15.9 percent), distraction, other pedestrians (13.7 percent) and distraction, play activities (12.1 percent).

Pedestrian detection failures were identified as causal factors in 14.3 percent of the cases and as predisposing factors in 11.5 percent. The most common detection failures were produced by parked cars (7.4 percent), moving traffic (4.7 percent) and standing traffic (3.9 percent).

Pedestrian evaluation failures were more common than detection failures. The most common evaluation failure involved the pedestrian making a poor prediction of the pedestrian/vehicle path (13.3 percent). Alcohol and/or drug impairments were identified in a total of 11.6 percent of the cases; however, only 8.2 percent had this factor identified as causal. The pedestrian misperceived the driver's intentions in 8.9 percent of the cases.

Considerably fewer driver causal factors than pedestrian causal factors were identified; placing the culpability on the pedestrian in most of the cases. The most common driver factors were detection failures, followed by search failures, evaluation failures, course failures and avoidance action failures.

Driver course failures were indicated as being causally related in 22.3 percent of the cases and as predisposing in 11.3 percent. The most common driver course failure was speeding (13.3 percent); however, this factor was indicated as causal in only half of these cases. The second most common driver course failure involved the driver being out of control prior to involvement with the pedestrian. Although this factor occurred in 5.4 percent of the cases, its occurrence was almost always indicated as a causal factor.

Distractions of various kinds were the most common search failures. Traffic-related maneuvers (9.3 percent) and other pedestrians (5.6 percent) were the most common sources of distraction. The single most frequent driver factor involved in inadequate search or a failure to look carefully (15.2 percent). These drivers apparently looked but did not look carefully as opposed to those who were inattentive and were not paying attention to the driving task.

Driver detection failures were the most common driver factors indicated. Of the causal factors indicated parked cars (6.8 percent), moving traffic (4.7 percent), standing traffic (3.5 percent), and trees, brush and weeds (2.3 percent) were the most common. Although each of these factors was frequently identified as a predisposing

factor also, poor roadside lighting was the most frequently coded (5.5 percent) predisposing factor. A total of 9.6 percent of the cases had poor roadside lighting coded as either a causal or related factor. Thus, poor roadside lighting and parked cars were the two leading causes of driver perceptual interference failures.

Driver evaluation failures occurred in about as many cases as did pedestrian evaluation failures. However, drivers more often misperceived the pedestrian's intent than pedestrians misperceived the driver's intent. When this happened it was most frequently coded as a causal factor. Conversely the drivers tended to less frequently make a poor prediction of the pedestrian vehicle path. Driver alcohol/drug impairment was coded in a total of 6.8 percent of the cases; in approximately two-thirds of these (4.7 percent) the impairment was listed as causal. The pedestrians were nearly twice as likely to be alcohol or drug impaired.

Driver avoidance action failures were listed as a causal factor in 13.2 percent and as a predisposing factor in 7.8 percent of the cases. Most frequently environmental limits such as slippery surfaces were cited; however, an improper decision and a failure to match evasive action were also often coded.

Running on or into the roadway was coded for 29.5 percent of the cases. In 99 percent of these cases the factor had either primary or secondary importance. Risk-taking by the pedestrian was noted in 23.5 percent of the accidents. This category included walking along the roadway, crossing a very busy roadway and other intrinsically dangerous activities. Short-time exposure was coded in 17.4 percent of the cases. Inadequate search and detection occurred about as frequently (17.3 percent). Alcohol was a factor in 10.3 percent of the cases; however, it was considered of primary importance in only half of those accidents (5.5 percent).

Accident Typology

A number of accident types or accident scenario descriptions have been developed to describe the kinds of accidents that tend to occur in rural and suburban areas. Most frequently a particular accident type is distinguished by the presence (or absence) of one or more critical descriptors. In order to describe and type and, in turn, develop effective countermeasures, it is useful to identify other salient characteristics associated with the specific accident types. Although nearly 30 specific rural and suburban accident types have been identified, the five most common types account for over half of the rural and suburban pedestrian accidents. These five accident types are:

Dart-out, first half
Dart-out, second half
Midblock Dash
Intersection Dash
Walking along roadway

Each type accounts for between 10 percent and 12 percent of all rural and suburban pedestrian accidents. The characteristics of each are described below.

Dart-out, First Half

The dart-out, first half typically involves a young child running into a two-lane local residential street not at an intersection and during the late afternoon. The most important characteristic is that the pedestrian appears suddenly in the path of the vehicle; in over half of the cases the pedestrian ran from behind a parked car.

Dart-out, Second Half

Like the previous type, the dart-out, second half involves a child crossing a residential street at a midblock location. In this type the pedestrian successfully crosses the first half of the roadway and is struck in the second half. The pedestrians struck in this situation tend to be slightly older and the role of parked cars as a contributing factor is much less than for dart-out, first half accidents.

Midblock Dash

The midblock dash typically involves a child running into or across the roadway midblock in a residential area. The driver is usually aware of the pedestrian before the collision is imminent but frequently misinterprets the pedestrian's intentions. Thus, unlike the dart-out, the pedestrian does not appear suddenly in the path of the vehicle.

Intersection Dash

The intersection dash typically involves a child running across the roadway at an intersection in a residential or commercial area. Although running and short-time exposure by the pedestrian are very frequent, the driver is also often aware of the pedestrian and misinterprets his intentions. The vehicle is near or in a non-signalized intersection and is almost always going straight ahead. Only 18 percent of the pedestrians struck were in a marked pedestrian crosswalk and only 10 percent of the intersections were signalized.

Walking Along the Roadway

This, the largest type identified, involves a pedestrian, usually between 10-24 years old, walking along a two-lane roadway in a residential, country location. They frequently occur with the pedestrian walking with traffic at night. Most of the accident locations were poorly illuminated and did not have a sidewalk or an improved shoulder suitable for pedestrian travel.

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APPENDIX D

PEDESTRIAN-RELATED DEVELOPMENT GUIDELINES FROM PLAZA INTERNATIONAL, ORLANDO, FLORIDA

F.1 GENERAL:

One of the key elements in the development of the Master Plan for Plaza International is the promotion of pedestrian traffic throughout the Subdivision. The benefits of increased pedestrian circulation within the project are (i) the increased economic benefit to the several Owners within the Subdivision through increased exposure for impulse spending; (ii) visitors will spend more time within the Subdivision if on foot as they might if they were in their automobiles; (iii) vehicular traffic loads will be decreased within the Subdivision with the increase in pedestrian traffic; and (iiii) this will result in increased ease in pedestrian circulation and safety and will also reduce the amount of vehicular roadway area required to handle the Subdivision's internal circulation.

With these goals in mind, the Developer has made provision for the establishment of a total-pedestrian walkway system throughout Plaza International. The pedestrian system will be developed at two levels: First, a roadside-pedestrian easement which will run adjacent to all public roadways throughout the Subdivision; and second, an internal-pedestrian walkway to serve pedestrian needs between adjacent properties.

The specific requirements and provisions for the elements of the pedestrian-walkway system are as follows:

F.2 ROADSIDE-PEDESTRIAN EASEMENT:

F.2.1 LOCATION AND SIZE:

A roadside-pedestrian easement (RPE) has been established throughout the Subdivision and will be located along all public roadway rights-of-way within the Subdivision except for the right-of-way for Interstate 4, the Bee Line Expressway and any existing or future on and offramps to these roads. All sites contiguous to the right-of-way for primary roads within the Subdivision will contain and be subject to a RPE twenty (20) feet in width. and all sites contiguous to secondary roadways will be subject to a RPE fifteen (15) feet in width. The RPE will be contiguous and parallel to the road right-of-way.

F.2.2 USE OF ROADSIDE-PEDESTRIAN EASEMENT:

The RPE may be used: for the construction of any drainage and utility lines, mains, pipes, structures, and facilities needed for the orderly development of the Subdivision; for the placement and construction of any other utility facilities installed and maintained by licensed utilities or similar requirements needed by an Owner to complete the development of a given site and; for the placement and location of sidewalks, landscaping, pedestrian lighting, sun shelters, bus shelters, general street furniture such as benches, drinking fountains, trash receptacles, mail boxes, public directional and informational signage, and regulatory signage.

F.2.3 CONSTRUCTION AND SCREENING WITHIN THE EASEMENT AREA:

All utilities contained within the RPE shall be constructed below finished grade with the exception of transformer pads, pull boxes, junction boxes, and other electrical or mechanical fixtures which would create an economic, safety or operational hardship by being placed underground. Any above-ground facility shall be screened with landscape material by the Developer or the utility company when located within the dedicated right-of-way or primary and secondary roadways and shall be screened with landscape material by the Owner or utility company when located within the RPE.

F.2.4 SIDEWALKS:

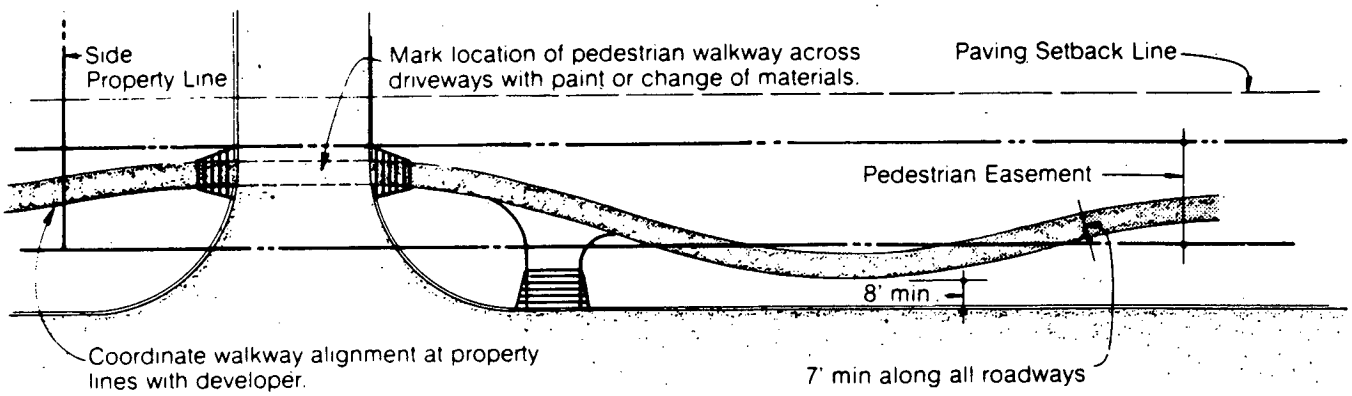
The Owner shall construct paved sidewalks within the roadside-pedestrian easement or adjoining dedicated road rights-of-way throughout the full length of the Owner's frontage abutting primary and secondary roadways, including, as required, all connections with Developer supplied crosswalk ramps, and connections to paved areas associated with Sun/Bus Shelters. Sidewalks shall be constructed of concrete (non-colored) and given a broom finish with tooled control joints. Sidewalks shall be seven (7) feet in width along primary and secondary roadways. The Owner's architect or engineer may determine the alignment of sidewalks within the Owner's area of responsibility so long as the sidewalk does not encroach any closer than eight (8) feet from the back of public roadway curbing, and proper alignment connections are made at the Owner's side property lines to insure alignment continuity with adjoining sites. Suggested sidewalk layout will be provided by the Developer prior to the start of the Owner's preliminary site planning efforts. The Developer will assist in the coordination of sidewalk-layout continuity with adjoining sites. The Owner shall maintain and repair all sidewalks at all times (see Sketch F-1 for criteria) (see Sketch F-2 for optional layout criteria).

F.2.5 LANDSCAPE MAINTENANCE:

Each Owner shall install and maintain landscaping and irrigation systems within the roadside-pedestrian easement areas included in the Owner's site and the dedicated road rights-of-way adjacent and contiguous to the Owner's site. The design, installation and maintenance of the landscaped areas shall be in accord with the provisions of these Guidelines.

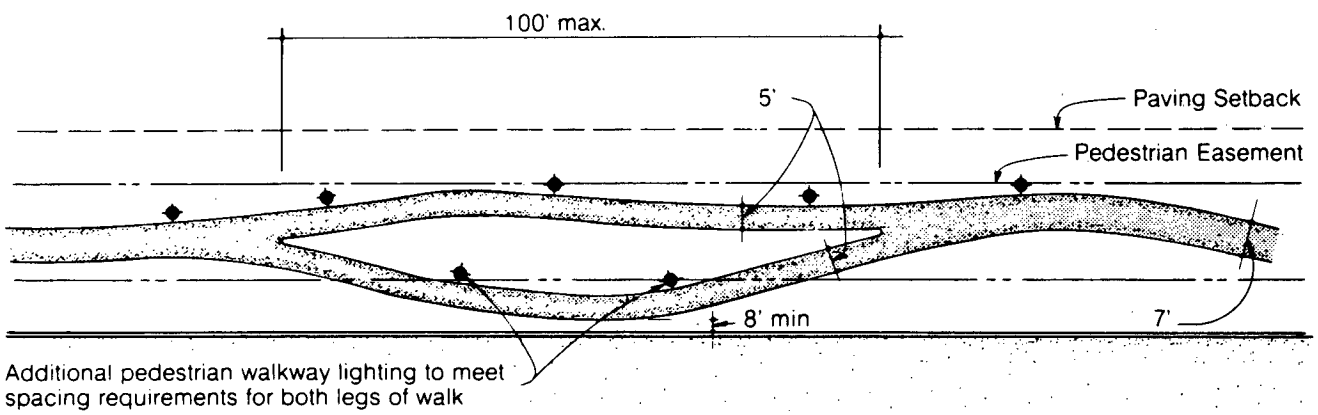
F.2.6 SIDEWALK LIGHTING:

The Subdivision shall have a uniform system of roadside sidewalk lighting. Bollard light fixtures will be provided and installed by the Developer within the RPE as specified by these Guidelines. The energy and/or rental

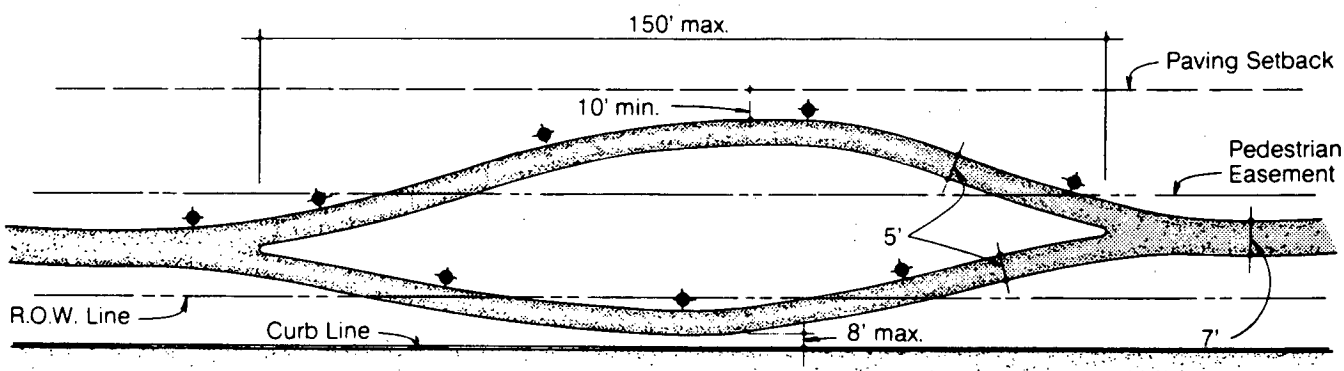


Pedestrian Walkway Criteria

Sketch F-1



Island Options for Sites Less Than 2.5 Acres



Island Option for Sites Larger Than 2.5 Acres

Pedestrian Walkway Island Options

Sketch F-2

charges for the operation of these fixtures shall be assessed by the Plaza International Lighting District ("Lighting District") on a pro rata or per fixture charge. The Lighting District shall maintain all roadside-sidewalk lighting fixtures in proper repair including the replacement of bulbs, lenses, elements and other components. The Owner may install additional lighting fixtures as approved by the Developer within the roadside-pedestrian easement; provided, however, the cost to install, operate, and maintain such fixtures shall be paid by the Owner (see Sketch F-3).

F.3 INTERNAL-PEDESTRIAN EASEMENTS:

Two (2) or more Owners on approval of the Developer may set aside special pedestrian-easement areas "Internal-Pedestrian Easements" (IPE) to facilitate pedestrian and light-vehicular traffic between two (2) or more contiguous or adjacent sites; the term contiguous includes sites interrupted by existing easements or setbacks. Design, maintenance and operational agreements for any internal-pedestrian easements must be approved by the Developer and shall be in the form of a contract binding upon all parties and shall be in accord with the applicable provisions of any Special Purpose Taxing Districts established within the Subdivision (see Sketch F-4).

F.3.1 CONSTRUCTION REQUIREMENTS:

Internal-pedestrian easements may contain walkways constructed of any durable material approved by the Developer and shall have a width not exceeding fifty percent (50%) of the combined paving setback requirements of adjacent sites; but, in no case shall the internal-pedestrian walkway exceed six (6) feet in width when running parallel to the common property line, nor twenty (20) feet in width when connecting paved areas across the common property line.

F.3.2 LIGHTING-IPE:

Lighting for the IPE shall be designed to provide one-half (1/2) footcandle illumination over the total length of the walkway. The cost of installation and energy for these sidewalk lighting fixtures shall be paid by the contracting Owners installing the IPE.

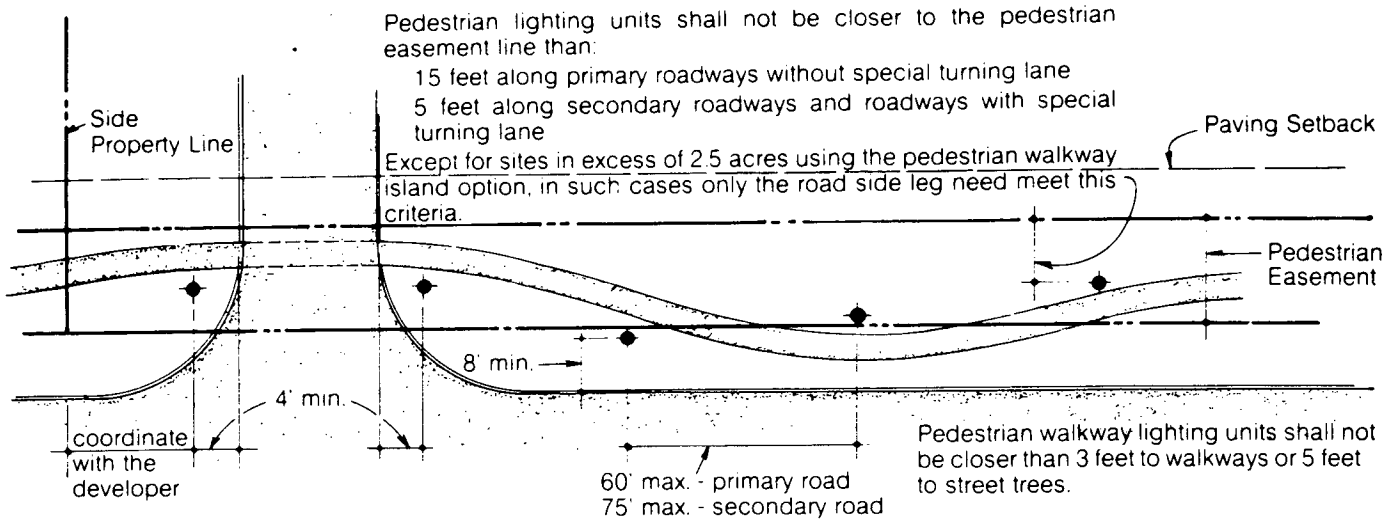
F.3.3 IPE MAINTENANCE:

Owner maintenance of internal-pedestrian easements shall include the removal of trash, debris and other materials which may be offensive or hazardous to pedestrian or light-vehicular traffic. Failure to properly maintain pedestrian easements shall subject each Owner to a pro rata charge based upon fronting footage of such easements for services rendered by the Developer or any Special Purpose Maintenance District established within the Subdivision.

F.4 INTERNAL-SITE WALKWAYS:

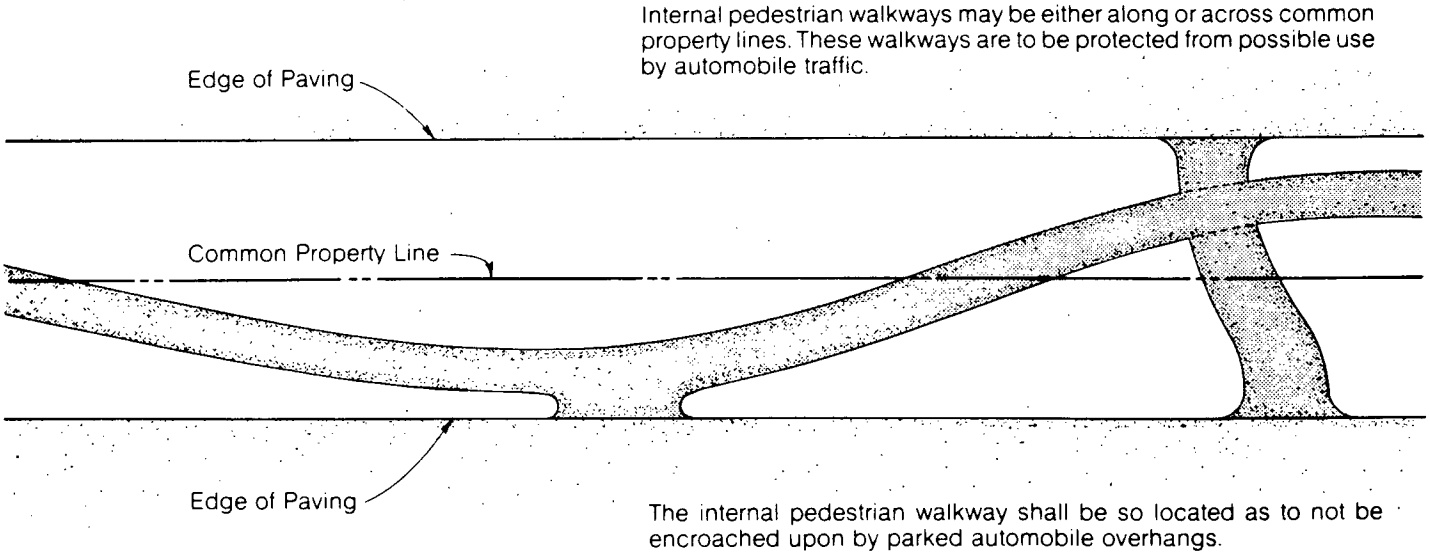
The Developer has no fixed requirements for pedestrian walkways within individual sites; however, the Developer urges the Owner to provide adequate connections from the roadside-pedestrian walkways and any internal-walkway systems adjacent to their individual sites to the facilities they erect on their sites.

Specific recommendations for individual-site, internal-walkway layouts will be made on an individual site basis and within the context of the walkway system elements being developed within the neighborhood. To this end, the Developer will make these recommendations at the time of preliminary site plan approval.



Pedestrian Walkway Lighting Criteria

Sketch F-3



Internal Pedestrian Walkway Criteria

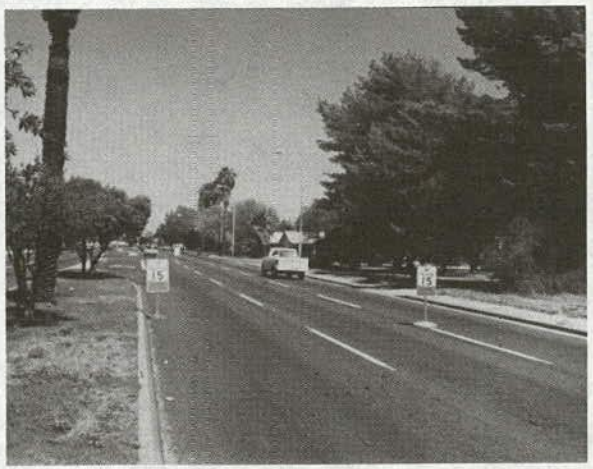
Sketch F-4

APPENDIX E
A COLLECTION OF PHOTOGRAPHS ILLUSTRATING PEDESTRIAN PLANNING AND DESIGN TREATMENTS

Pedestrian push buttons on the median can assist stranded pedestrians.

A bold, painted median can give the pedestrian some refuge, but a raised median or refuge island would be much better.

The pedestrian crossing signal and opening in the barrier are provided for access between two commercial establishments on this arterial.

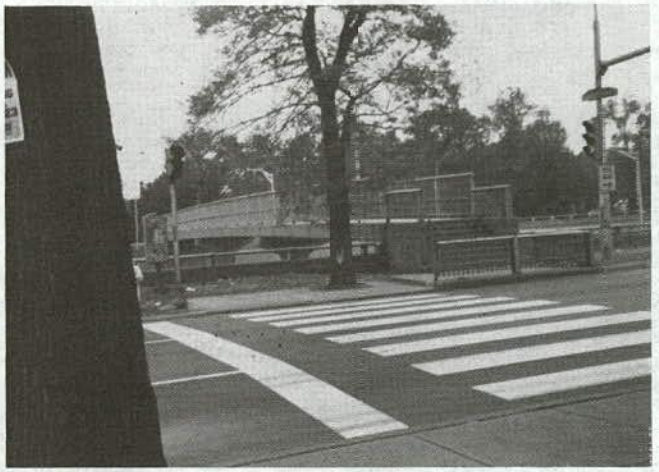


Portable school crossing signs are used in Phoenix to slow vehicles and delineate the crossing area.

Simple patio-block connections are sometimes all that is needed to make life easier for the pedestrian.

Visible signing placed over the tops of cars can help pedestrians to find their way through parking lots and other areas.

On stairs, pedestrians sometimes want to come to a landing before they pause to look for cars. Instead of dumping the stairs directly onto the street, a landing might have been provided and the crosswalk brought across perpendicular to the roadway.



This design provides a landing and barrier to remind pedestrians to stop, look, and think before they cross.

This simple walkway was provided for pedestrians to cross the railroad tracks.

A well-landscaped walkway through a parking lot. Stop bars are provided for vehicles, and drivers are well aware of the pedestrian presence. However, care should be given to provide adequate sight distance by maintaining landscaping at a low vertical height.

Parking lots should be striped to prohibit vehicle parking where walkways enter the parking lot.

This entrance from the periphery of a mall is well-delineated.

Where the major crossing point is not at the intersection itself, an auxiliary crosswalk may be needed to delineate the crossing area and to discourage vehicles from blocking it.

Pedestrian access should be provided where there are natural desire lines between buildings and the street.

Unique crossing treatments can be provided where vehicles enter a predominately pedestrian precinct. They can also add to the area's character.

Simple openings in walls can shorten walking distance.

Wide sidewalk setbacks in residential areas make for pleasant walking environments, and are simple to accomplish if thought about at the development stage.

Paved shortcuts through corners are both functional and aesthetic.

Where guardrail is needed at embankments, it is preferable to place the pedestrian walkway outside the guardrail.

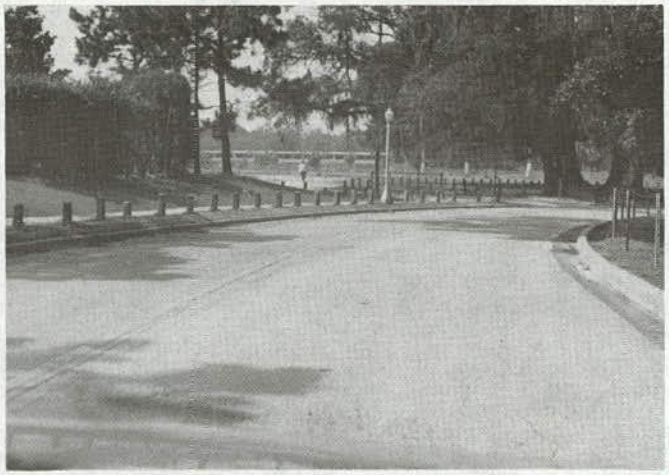
Protective barriers for pedestrians at bridges are also a positive feature, and need not be expensive. However, the end treatments are important for vehicle safety.

Paving across the planting strip at bus stops provides a stable, mud-free surface for pedestrians.

Small concrete pads for bus stops a simple but welcome addition. This one required only a slight widening of the embankment.

Small islands at uncontrolled crossings act as a refuge area.

Land at the corners of skewed intersections can often be used for pocket parks or rest areas for pedestrians.



Bollards provide an aesthetic separation of the walkway from the roadway.

Some way can usually be found to keep obstacles out of the pedestrian's path, if given some thought.

APPENDIX F

ANNOTATED BIBLIOGRAPHY OF SELECTED REFERENCES

GENERAL PLANNING TEXTS

Chapin, F. Stuart, Jr , and Edward J. Kaiser, Urban Land Use Planning, 3rd ed., Urbana, IL, University of Illinois Press, 1979.

This book discusses the features, theories, and concepts for the control of land use. It provides a background on the development of a land use inventory, the issues associated with the arrangement of land uses, and describes the various concepts that have been applied to foster orderly and efficient land development. This has implications on the potential for pedestrian linkages between uses.

DeChiara, Joseph, and Lee Koppelman, Urban Planning and Design Criteria, 2nd ed., New York, NY, Van Nostrand Reinhold Co., 1975.

This is a reference text for planning issues such as climate, land use, population, housing subdivision, vehicular circulation, air and rail transportation, community facilities, commercial/industrial development, neighborhood units, utilities and zoning/codes. It has only minor references to pedestrian design are noted below.

Goodman, William I. and Eric C. Freund, Principles and Practice of Urban Planning, Wash., D.C., International City Managers' Association, 1968.

This book provides a complete overview of the urban planning process. It begins with discussions of the origins of planning, it describes the basic types of studies that are needed for urban planning, and it outlines organizational schemes for a planning organization. The book also describes methodologies used in urban planning for design, quantitative analysis, and social welfare. The role of various regulatory mechanisms and the implementation of plans, policies and programs are covered.

International City Management Association (ICMA), The Practice of Local Government Planning, (Municipal Management Series), Wash., D.C., ICMA, 1978.

This is one of the most commonly used reference texts for public sector planning. The topics it covers relate to the full range of municipal planning issues. Its contents include: values and history of city planning, agency management, information, finance/budget, development plans, utilities, transportation, industrial development, recreation facilities, education, arts, urban design, subdivision/zoning, city renewal, social planning, citizen participation, economic development, and urban housing. Because the topics are so broad, this book only touches on pedestrian planning/design in a very minimal way.

PEDESTRIAN FACILITY PLANNING

Axler, E.A., Warrants for Pedestrian Over and Underpasses, Falls Church, VA, Technology Applications, Inc., July 1984. (FHWA-RD-84/082)

This research study reviewed the needs and applications of pedestrian over/under passes and developed warrants for justifying the installation of these types of pedestrian facilities. The warrants developed considered pedestrian volumes, vehicular volumes, and the distance to the nearest safe crossing. In addition, other requirements for assuring the effectiveness of over or under passes were outlined.

Brambilla, Roberto and Gianni Longo, For Pedestrians Only: Planning, Design and Management of Traffic-Free Zones, New York, NY, Watson-Guptill Publications, 1977.

This book summarizes the need for pedestrian zoning, explains how these zones are planned, designed and implemented, and then documents these conclusions with 20 case studies taken from European and American cities. The appendix includes a compendium of American urban malls.

Braun, Ronald R. and Marc F. Roddin, "Quantifying the Benefits of Separating Pedestrian and Vehicles," NCHRP Report 189, Wash., D.C., Transportation Research Board, 1978.

This research report analyzed the need for the separation of pedestrian and vehicular facilities and developed an evaluation methodology for assessing the benefits associated with particular situations. A number of case study applications of this methodology are reported.

Breines, Simon and William J. Dean, The Pedestrian Revolution; Streets Without Cars, New York, NY, Vintage Books, 1973.

This book analyzes the importance and history of the pedestrian in the urban scene. It describes design concepts called pedestrian islands and districts for the purpose of recapturing urban space for the pedestrian. It also discusses the role of the bicycle and other transportation modes, the considerations for pedestrians in suburbia, and outlines actions for bringing about greater emphasis on pedestrian facilities.

Ferlis, R.A. and L.S. Kagan, Planning for Pedestrian Movement at Interchanges, Wash., D.C., Peat, Marwick & Mitchell & Co, July 1974. (FHWA-RD-74-65)

This document describes the findings of a research project aimed at analyzing the problems faced by pedestrians in interchange areas and developing guidelines for addressing these problems. A number of examples of interchange treatments to accommodate pedestrians are presented.

Institute of Traffic Engineers (ITE), Traffic Planning and Other Considerations for Pedestrian Malls, Wash., D.C., ITE, Oct. 1966.

This manual describes the considerations necessary for a successful pedestrian mall. It includes discussions of traffic improvements for pedestrians, planning, traffic circulation, parking, transit operations, trucks and freight movement, police/fire/emergency services, and amenities for the pedestrian.

Kagan, L.S., W.G. Scott, and U.P. Avin, A Pedestrian Planning Procedures Manual, Baltimore, MD, RTKL Associates, Inc., Nov. 1978, vols. (FHWA-RD-79-45 thru 47)

This manual identifies the significant data, procedures, and criteria that should be considered in the planning and evaluation of both comprehensive pedestrian systems and individual facilities. This manual is divided into three volumes. The first covers the needs and processes associated with pedestrian planning, the second outlines in detail the recommended steps, and the third presents the background materials related to the application of procedures.

LaBaugh, William C. and Michael J. Demetsky, Pedestrian Planning in Suburban Areas - A State of the Art Review, Charlottesville, VA, Virginia Highway & Transportation Research Council, Dec. 1974.

This study developed general guidelines for the planning and evaluation of suburban pedestrian systems from a review of previous studies. Measures of system effectiveness were developed with total walking distance emerging as the predominant factor.

Levinson, Herbert S., "Pedestrian Way Concepts and Case Studies," Highway Research Record 355, Wash., D.C., Highway Research Board, 1971, pp. 69-89.

Organization for Economic Cooperation & Development (OECD), Streets for People, Paris, France, OECD, 1974.

Prokopy, J.C., A Manual for Planning Pedestrian Facilities, Wash., D.C., Peat, Marwick, Mitchell & Co:, June 1974. (FHWA-IP-74-5)

This manual was intended to provide engineers and planners with the basic considerations for planning pedestrian facilities. The topics of trip generation, movement patterns, and types of pedestrian facilities are covered as well as the nature of impacts and the costs associated with pedestrian facilities.

Pushkarev, Boris S. and Jeffrey M. Zupan, Urban Space for Pedestrians, Cambridge, MA, MIT Press, 1975.

This book analyzes the need for pedestrian space in urban areas. It establishes a framework for analysis. Outlines means to estimate pedestrian travel demand and density, reviews pedestrian space requirements and its relationship to flow, and translates the various factors into guidelines for the design of facilities. The design guidelines address sidewalks, transit facilities, auto free zones, pedestrian space in buildings, grade separation, and mechanisms for implementation.

Roddin, Marc F., "A Manual to Determine Benefits of Separating Pedestrians and Vehicles," NCHRP Report 240, Wash., D.C., Transportation Research Board, Nov. 1981.

This research report presents a follow-up to a previous report on quantifying the benefits of separating pedestrians and vehicles. This document provides an improved methodology which offers streamlined procedures and the capability to incorporate the effects of additional transportation, health/safety/environmental, and residential and business oriented benefits.

Scott, William G. and Leonard S. Kagan, A Comparison of Costs and Benefits of Facilities for Pedestrians, Wash., D.C., Peat, Marwick, Mitchell & Co., Dec. 1973. (FHWA IRD-75-7)

This report discusses the costs and benefits of facilities for improving pedestrian circulation, safety, and environment in downtown or other areas where grade separation is applicable. A general framework for estimating pedestrian demand, facility costs, and impacts is presented for the evaluation of alternative plans.

SITE PLANNING

Casazza, John A., et al., Shopping Center Development Handbook, 2nd ed., (Community Builders Handbook Series) Wash., D.C., Urban Land Institute, 1985.

This Handbook outlines the various aspects of the planning, design, implementation, and marketing of shopping center developments. It is highly oriented to developers but does provide some useful information relative to the layout of shopping centers to accommodate pedestrians.

Crane, Carla S., ed., et al., Energy-Efficient Community Development Techniques, Wash., D.C., Urban Land Institute, 1981.

This report describes the results of the ULI project on Site and Neighborhood

Design in which various concepts for reducing total energy consumption were assessed. This report summarizes the findings of five case studies. One element of this program focused upon site layout and the provision of facilities to encourage the use of non-motorized modes of travel or transit.

DeChiara, Joseph and Lee E. Koppelman, Time-Saver Standards for Site Planning, New York, NY, McGraw-Hill Book Co., 1984.

This handbook outlines the various considerations and design standards applicable to a wide range of land development projects. This handbook includes design standards for sidewalks, walkways, stairways, ramps, and other elements of a pedestrian circulation system.

Lochmoeller, Donald C., et al., Industrial Development Handbook, (Community Builders Handbook Series), Wash., D.C., Urban Land Institute, 1968.

This handbook outlines the various aspects associated with the planning, design, implementation, and marketing of industrial land development projects. This document is oriented to the major concerns of the developer and therefore only provides limited guidance relative to the need or design for pedestrian facilities in industrial development projects.

Lynch, Kevin and Gary Hack, Site Planning, 3rd ed., Cambridge, MA, MIT Press, 1984.

This is a classic text about the myriad issues involved in organizing, designing and producing a site plan. It includes discussion of: the art of site planning, analyzing a locality, organizing place and action, site form and ecology, social and physchological analyses, movement systems, streets and ways, earthwork and utilities, sensuous form, problems of control, design and management of the site, design methods, costs, housing, special types of site planning. Its best use is as a stimulus when "thinking" about the combinations of activities in a community and what to consider in their "designed" combination. This is a design text more than a reference text, and includes several noteworthy observations about pedestrian movement systems.

O'Mara, W. Paul et al., Office Development Handbook, (Community Builders Handbook Series), Wash., D.C., Urban Land Institute, 1982.

This handbook describes the planning, design, implementation and marketing aspects associated with office development projects. It is oriented to developers but provides limited guidance on the needs for pedestrian facilities in these types of development.

O'Mara, W. Paul, Residential Development Handbook, (Community Builders Handbook Series), Wash., D.C , Urban Land Institute, 1978.

This handbook provides insights for the developer relative to the development or renovation of residential complexes. It covers the needs for the creation of pedestrian linkages within the development and to adjacent land uses and discusses options to allow the linkages. It also discusses the design and maintenance considerations associated with sidewalks and walkways.

RTKL Associates, Inc., Feasibility Analysis and Design Concepts and Criteria for Community-wide Separated Pedestrian Networks, Baltimore, MD, (prepared for U.S. Dept. of Transportation), Federal Highway Administration, 1975. (DOT-FH-11-8816)

This document presents a detailed analysis of the development of pedestrian networks and outlines a methodology to plan for such facilities. The analysis reviews the factors determining the feasibility of pedestrian networks in new towns and existing communities. A number of case study reviews are presented.

Simonds, John W., Landscape Architecture: A Manual of Site Planning and Design, New York, NY, McGraw Hill Book Co., 1983.

This book presents information on the integration of the natural and man-made landscape into the total site planning process. It provides practical principles on planning and design to enhance the pedestrian environment.

Smart, J. Eric, Making Infill Projects Work, Wash., D.C., Urban Land Institute, 1985.

This document focuses upon the market opportunities, general planning and design considerations, public/private interaction, and construction, financing and marketing strategies appropriate for integrating new projects on relatively small sites surrounded by other developments 15-20 years old. A number of case study projects are described.

Smart, J. Eric, et al., Recreational Development Handbook, (Community Builders Handbook Series), Wash., D.C., Urban Land Institute, 1981.

This handbook addresses the considerations associated with the development of resort communities, theme parks, and commercial recreational facilities. Numerous examples are given, but no guidelines are provided relative to traffic, parking, and pedestrian needs associated with such projects.

WALK TRIP CHARACTERISTICS

Comsis Corp., Survey Data Tabulations; Nationwide Personal Transportation Study, 1983-1984, Wheaton, MD, (prepared for) U.S. Dept. of Transportation, Urban Mass Transportation Administration, Nov. 1985.

This document contains a series of tables derived from the 1983-84 National Personnel Transportation Survey. These tables describe the magnitude and nature of vehicles and, person trips, stratified by various locational characteristics.

Breschen, Darrell, A., National Personal Transportation Study - Transportation Characteristics of School Children, Wash., D.C., U.S. Dept. of Transportation, Federal Highway Administration, July 1972.

This document summarizes data from the 1969 National Personnel Transportation Study on the characteristics of trips to primary and secondary schools in the U.S. It is one of the few comprehensive nationwide summaries available on the travel of children to school.

Maring, Gary E., "Pedestrian Travel Characteristics," Highway Research Record 406, Wash., D.C., Highway Research Board, 1972, pp. 14-20.

This paper describes the nature of pedestrian travel characteristics found in a survey conducted in the Washington, D.C. area. The information derived included breakdowns by trip length, age, sex, purpose, income group, day of week, and factors influencing the decision to walk.

Perfater, Michael A. and Michael J. Demetsky, Pedestrian Attitudes and Behavior in Suburban Environments, Charlottesville, VA, Virginia Highway and Transportation Research Council, December, 1974.

This study documents the findings of a study conducted in suburban areas in Virginia relative to pedestrian attitudes and behavior. The study defined the characteristics of the suburban pedestrian and identified key factors relative to their needs and acceptance of various types of pedestrian facilities.

Robinson, Ferrol O., Jerry L. Edwards and Carl E. Orne, "Strategies for Increasing Levels of Walking and Bicycling for Utilitarian Purposes," Transportation Research Record 743, Wash., D.C., TRB, 1980, pp. 38-48.

This paper was based upon a major survey of motorized and non-motorized travelers to identify the problems associated with walking, to find possible incentives to encourage utilitarian walking, and to study the effectiveness of these incentives. The findings indicated that compact land-use patterns and the provision of pedestrian/bicycle facilities would be the most effective incentives.

VanHorne, Merle J., Laura B. Sywak, and Sharon A. Randall, Outdoor Recreation Activity Trends--Insights from the 1982-83 Nationwide Recreation Survey, Wash., D.C., National Park Service, 1985.

This paper summarizes the results of a survey by the National Park Service of recreational activity in the United States. Many types of activities were covered, including walking for pleasure, running or jogging, day hiking and bicycling.

Walkways - Update on Walkers and Walking, The Walkways Center, Wash., D.C., published bi-monthly.

This bi-monthly newsletter provides information on curent events of interest to members of this walking association. It reports information on trends in walking, local initiatives of pedestrian groups and information on forthcoming walking events.

PEDESTRIAN FACILITY DESIGN

Appleyard, Donald, Livable Streets, Berkeley, CA, University of California Press, 1981.

This report provides a comprehensive study of the effects of traffic on selected residential neighborhoods in San Francisco. It provides additional data on experiences with protecting neighborhoods in San Francisco, Oakland, and Berkeley, and in the United Kingdom, Sweden, Holland, Denmark, Germany, Italy, Australia, Japan, India, and Thailand. It discusses and evaluates alternative strategies and contains an extensive bibliography.

Appleyard, Donald, M. Sue Merson and Mark Lintell, Livable Urban Streets: Managing Auto Traffic in Neighborhoods, Berkeley, CA, Institute of Urban and Regional Development, University of California, Jan. 1976 (FHWA/SES-76-03).

This report describes the effects of auto traffic on street life in residential neighborhoods, evaluates efforts to manage traffic, and outlines methods for carrying out a traffic management plan. Impacts of traffic on neighborhood liability were determined from an extensive survey of local residents. Various European programs to improve neighborhoods through traffic management were provided as examples.

Center for Design Planning, Streetscape Equipment Sourcebook 2, Wash., D.C. Urban Land Institute, 1979.

This document describes the various types of equipment which may be used in conjunction with pedestrian walkways to provide for the needs of the pedestrian and/or to improve aesthetics in the walking environment.

Collins, Bert K., The Audible Landscape: A Manual for Highway Noise and Land Use, Cambridge, MA, Urban Systems Research and Engineering, Inc., Nov. 1974 (GPO SN 5000-00079).

This document describes various administrative and physical techniques for noise reduction and abatement. It also includes a discussion of implementation techniques and the possible difficulties.

Davies, Stephen C., Designing Effective Pedestrian Improvements in Business Districts, (Planning Advisory Service Report No. 368), Wash., D.C., American Planning Association, May 1982.

This document provides a brief overview of the types of improvements that can be considered in business districts, including the downtowns of small communities. It draws from examples of pedestrian improvements implemented in various U.S. cities.

DeLeuw, C., Jr., et al., Effective Treatment of Over and Undercrossings for Use by Bicyclists, Pedestrians and the Handicapped, San Francisco, CA, DeLeuw, Cather & Co., Jan. 1981.

Fee, Julie Anna, European Experience in Pedestrian and Bicycle Facilities, Wash., D.C., Federal Highway Administration, 1975.

This report is a review of pedestrian and bicycle facilities in Europe. It provides pictures and descriptions of novel features and discusses the differences in the planning and implementation techniques used in various countries.

Fruin, John J., Pedestrian Planning and Design, New York, NY, Metropolitan Association of Urban Designers and Environmental Planners, Inc., 1971.

This manual provides basic design guidelines for pedestrian facilities. Concepts of pedestrian level of service and space requirements are used to establish design standards for sidewalks, stairways, ramps, and other pedestrian facilities.

Organization for Economic Cooperation and Development (OECD), Traffic Safety in Residential Areas, OECD, Paris, 1979.

This report reviews the problem of traffic safety in residential areas in the context of differing functional features, development characteristics, and administrative/legal procedures. A list of traffic and regulatory measures which can be applied in residential communities is presented.

Partners for Livable Places, The Way to Go; The Benefits of Quality Design in Transportation, Wash., D.C., National Endowment for the Arts Design Arts Program and U.S. Dept. of Transportation, April 1983.

This report analyzes the importance of art in the planning and design of transportation facilities. The value of this approach is reviewed from the perspective of case studies around the country including a number which indicate enhanced pedestrian circulation.

Public Technology, Inc., Proceedings, Fourth Annual Pedestrian Conference, Wash., D.C., Federal Highway Administration, July 1984 (FHWA-TS-84-218).

This document summarizes a series of presentations made at the Fourth Annual Pedestrian Conference in Boulder, Colorado. A series of papers and presentations were made both on pedestrian safety and facility design, including European experience.

Residential Streets; Objectives, Principles & Design Considerations, Wash., D.C., Urban Land Institute, American Society of Civil Engineers, & National Association of Home Builders, 1974.

This concise document presents an overview of the needs for traffic improvements on residential streets. It outlines a series of planning, design, safety, and construction principles oriented toward making the residential street safer, more livable, and economical.

Richter, Richard A. and Charles L. King, Guidelines for Making Pedestrian Crossing Structures Accessible, McLean, VA, Federal Highway Administration, Aug. 1984 (FHWA-IP-84-6).

This report outlines the need to make pedestrian over and under crossing structures accessible to handicapped persons. Guidelines are proposed for the designs of these structures to assure that they are accessible for persons in wheelchairs or visually impaired.

Smith, Daniel T., Jr. and Donald Appleyard, Improving the Residential Street Environment, San Francisco, CA, DeLeuw, Cather & Co., May 1981, vols. (FHWA-RD-81-030 and 031).

This final report summarizes state of the art research on a broad range of techniques for residential street traffic control or traffic management and specific case study research on applications of the TRRL-developed "road hump" on U.S. residential streets. It also summarizes findings of original research on resident preferences regarding traffic speed and volume on residential streets, on factors which affect drivers' speed choice on residential streets, and reviews legal considerations in neighborhood traffic management.

Swan, S. and Sgourakis. Effective Treatments of Over and Under Crossings for Use by Bicyclists, Pedestrians, and the Handicapped. Literature Review. Washington, D.C.: U.S. Department of Transportation, Federal Highway Administration, 1980.

This report includes an analysis of readily available literature on the subject and information about recent experiences in planning, designing, and constructing crossing facilities.

Templer, J., The Development of a Priority Accessible Network - An Implementation Manual, Wash., D.C., U.S. Dept. of Transportation, 1980.

This report provides guidelines for the design and development of accessible routes for elderly and handicapped pedestrians. The Manual includes a sequence of decision-making steps from problem identification through project implementation for planning accessible networks. Design details are provided for recommended solutions to major problems experienced by elderly and handicapped pedestrians.

Untermann, Richard K., Accommodating the Pedestrian; Adapting Towns and Neighborhoods for Walking and Bicycling, New York, NY, Van Nostrand Reinhold Co., 1984.

This book reviews the needs and characteristics of pedestrians and bicyclists in urban and suburban areas. It provides an abundance of concept sketches and pictures for adapting existing communities for pedestrians and bicycles. The concepts cover downtown, urban, and suburban-type communities.

Zegeer, C.V., K.S. Opiela, and M.J. Cynecki, Pedestrian Signalization Alternatives, Southfield, MI, Goodell-Grivas, Inc., July 1985 (FHWA/RD-83-102).

This research report describes the results of comprehensive analysis of accident histories at 1,200 intersections to determine if there was a difference in safety relative to the type of pedestrian signalization in place. The results of this analysis served as the basis for the development of signal and supplemental sign designs which were tested for their ability to improve pedestrian compliance and hence safety.

IMPLEMENTATION AND FUNDING

Bair, Frederick H., Jr., The Zoning Board Manual, Wash., D.C., American Planning Association, 1984.

This book provides a history of the zoning process and describes the powers and limitations of a zoning board. It discusses the use of variances and prescribes a lengthy series of rules for the administration and operation of the board.

Brambilla, Roberto, and Gianni Longo, A Handbook for Pedestrian Action, Wash., D.C., Institute for Environmental Action, in association with the Columbia University Center for Advance Research in Urban and Environmental Affairs, 1977. (US GPO)

Although the authors refer to this as a study from the point of view of community groups that advocate traffic-free zones, the Handbook provides a general treatment of the subject that will be useful to anyone concerned with pedestrian movement in urban areas. It contains an extensive bibliography and refers to many examples of pedestrian programs in the United States and elsewhere.

English, John W., Craig W. Conrath, and Michael Gallavan, "Pedestrian Laws in the United States," Traffic Laws Commentary, Oct. 1974, V.3:3, 245 p.

This document compares and contrasts the elements of pedestrian regulations in the various states. It covers the definition of pedestrian, pedestrian obedience, regulations regarding crossing of a roadway, pedestrian and driver responsibilities, and miscellaneous school area, parking, and speed limit laws.

Freilich, Robert H. and Peter S. Levi, Model Subdivision Regulations, Text and Commentary, American Society of Planning Officials, 1975.

This book provides a set of model subdivision regulations suitable for inclusion in local subdivision regulations to guide the planning and design of land and street development. The commentary elaborates on the rationale behind the regulations. Several pedestrian - related design items are included, such as requirements for sidewalk location and width and midblock pedestrian easement.

Glassford, Peggy, Appearance Codes for Small Communities, (Planning Advisory Service Report No. 379) Wash., D.C., American Planning Association, Oct. 1983.

This document reviews the experience of several communities with establish ordinances governing property appearance. It is relevant to improving and maintaining aesthetics in the pedestrian environment.

Hoover, Julie H. and Alan A. Altschuler, Involving Citizens in Metropolitan Region Transportation Planning, New York, NY, Parsons, Brinckerhoff, Quade & Douglas, Inc., 1977. (FHWA/SES-77/11)

This document is based upon the experiences with involving citizens in the transportation planning process. It describes methods for redefining the traditional concepts of planning and for identifying the parties affected by projects. It outlines a process for the structuring of citizen participation and summarizes the benefits that may result.

Kolis, Annette, ed , Thirteen Perspectives on Regulatory Simplification, (ULI Research Report #29) Wash., D.C., Urban Land Institute, 1979.

This report addresses the issue of regulatory simplification relative to land use controls. Public agency and consumer perspectives on simplification are examined and examples of the implemented and suggested changes in areas around the country are reviewed.

Meshenberg, Michael J., The Administration of Flexible Zoning Techniques, (Planning Advisory Service Report No. 318), Wash , D.C , American Planning Association, 1978.

This document describes the evolution of flexible land use controls and identifies the various forms these controls can take. The administrative aspects of the application of the flexible controls are examined. The types of flexible controls described include planned unit development, special permits, floating zones, overlay zoning, conditional rezoning, contract zoning, subdivision exaction and transfer of development rights.

Porter, Douglas R. and Richard B. Peiser, Financing Infrastructure to Support Community Growth, Wash , D.C., Urban Land Institute, 1984.

This document describes the problem of decreasing investments in infrastructure and analyzes the consequences. It identifies a number of alternative techniques for financing infrastructure investments including assessment districts, special districts, tax increment financing, user charges, development exactions or fees, private ownership, and combinations of the above. Various case study examples of these techniques are presented.

Priest, Donald E., et al., Joint Development: Making the Real Estate--Transit Connection, Wash., D.C., Urban Land Institute, 1979.

This report outlines mechanisms for joint development which can be used in conjunction with transit projects. The report also provides examples of the applications of these concepts relative to various types of transit projects.

Project for Public Spaces, Inc., Managing Downtown Public Spaces, Wash., D.C., American Planning Association, 1984.

The document reviews opportunities for making fuller use of downtown areas and for funding the continuing upkeep of these areas. It describes methods to supplement city maintenance, security, and transportation services to enhance the attractiveness of downtown areas. It describes methods for creating downtown marketplaces and offer suggestions for creative designs to improve public spaces.

Politano, A., Financing Urban Transportation Improvements, Wash., D.C., Federal Highway Administration, April 1983.

This report examines existing uses for private funds for highway improvements, assesses alternative mechanisms for obtaining private financing, and provides recommendations for public/private sector agreements of this form. Seven case study projects are presented to illustrate the applications of this concept.

Schwartz, Gail G., Where's Main Street, U.S.A.?, Westport, CT, ENO Foundation for Transportation, Inc., 1984.

This report analyzes the role of the central business district in the context of changing conditions in the urban economy. The nature of the transition is assessed relative to land uses and transportation and scenarios of future forces and their impact upon the role and form of the central business district are explored. Summaries of various downtown vitalization projects are provided.

Stoke, Charles B. and Charles L. Williams, The Pedestrian in the Transportation System: Proposed Traffic Safety Legislation, Charlottesville, VA, Virginia Highway & Transportation Research Council, Nov. 1981. (VHTRC 82-R27)

This report includes a review of Virginia traffic laws related to pedestrians and a comparison of its provisions to those of other states. The report provides recommendations for changes, deletions, and/or additions to the law to enhance safe walking.

PEDESTRIAN SAFETY

BioTechnology, Inc. Urban Intersection Improvements for Pedestrian Safety. Washington, D.C.: U.S. Department of Transportation, Federal Highway Administration, 1977.

Freeman, M. et al. Fixed Illumination for Pedestrian Protection. Final Report. Prepared for the Federal Highway Administration Washington, D.C.: U.S. Department of Transportation, 1975.

Highway Safety Overviews: Highlights of Recent Publications and Studies, Office of Highway Safety, FHWA, 1984.

This document provides an overview of various federal efforts related to pedestrian safety. It also provides a review of a number of demonstration project efforts. It is a good overview of the national pedestrian safety effort.

Knoblauch, Richard L., et al., Causative Factors and Countermeasures for Rural and Suburban Pedestrian Accidents: Accident Data Collection and Analysis, Falls Church, VA, BioTechnology, June 1977. (DOT HS 802-266 and 474)

This report and the accompanying appendices document a study of pedestrian accident types in rural and suburban areas. The study examined site characteristics and pedestrian behavior as related to various accident types. Twenty-three accident types were identified, but six types represented 60 percent of the accidents sampled. Countermeasures are discussed.

Model Pedestrian Safety Program; Users' Manual, Wash., D.C., U.S. Dept. of Transportation, Federal Highway Administration, June 1978.

The Manual provides guidelines and resource information for the development or improvement of local pedestrian safety programs. It identifies steps to follow to set-up a pedestrian safety program and provides information to help select safety countermeasures. It lists numerous possible solutions to safety problems and provides lists of additional references.

Orcutt, Fred L., and Hollins A. Walker, Jr., "Traffic Engineering for Pedestrian Safety," Transportation Engineering, V.48:1, Jan. 1978, pp. 16-22.

The article discusses the two major aspects of a pedestrian safety program: administrative provisions and traffic engineering design provisions. Regulations or procedures should be established to provide the city traffic engineer or other responsible officials with the necessary authority to administer and enforce the following in a pedestrian safety program: subdivision regulations, parking lot design regulations, sidewalk placement and design regulations; on-street parking control at pedestrian crossings, and periodic review of pedestrian generators and

attractors. Three areas of concern have been identified within traffic engineering design provisions for pedestrian safety: geometric signing, pavement markings, and signalization.

Pedestrian Accident Reduction Guide, Wash., D.C., U.S. Dept. of Transportation, National Highway Traffic Safety Administration, Nov. 1981. (DOT-HS 805-850)

The Guide presents a systematic approach to the pedestrian accident problem. The approach is based on grouping identified accident types and can be used in developing pedestrian safety programs at the State and local level. Various aspects of starting a new pedestrian safety program or modifying an existing one are discussed. Descriptions of accident types and countermeasures are included.

Reiss, Martin L., School Trip Safety and Urban Play Areas, Falls Church, VA, BioTechnology, Inc., 1975, vols. (FHWA/RD-75-104 thru 109)

This seven volume report presents guidelines for the protection of young pedestrians (5-14 years of age) while they are walking to and from school, entering and leaving school buses, and playing in their neighborhoods, and includes two volumes on urban play streets. In addition, it studies student and driver perception of trip safety and traffic control devices and evaluates daylight saving time as it relates to safety issues.

Snyder, Monroe B. and Richard L. Knoblauch, Pedestrian Safety. The Identification of Precipitating Factors and Possible Countermeasures, Silver Spring, MD, Operations Research, Inc., Jan. 1971, vols. (DOT-HS-800-404 & 403)

The study objective was to identify causes and countermeasures relevant to pedestrian accidents. Behavioral and descriptive data were collected for over 2,000 pedestrian accidents in 13 major cities. Cases were divided into accident types on the basis of casual factors and target groups to provide a basis for countermeasure identification.

Synthesis of Safety Research Related to Traffic Control and Roadway Elements, Wash., D.C., Federal Highway Administration, Dec. 1982, vols. (FHWA-TS-82-232)

This two volume document provides a summary and synthesis of research related to all aspects of highways. This document includes a chapter devoted to past studies of pedestrian safety and is a good, concise overview of factors involved in pedestrian accidents and the benefits of possible countermeasures.

Vallette, Gerald R. and Judith A. McDivitt, Pedestrian Safety Programs - A Review of Literature and Operational Experience, Falls Church, VA, BioTechnology, Inc., Jan. 1981. (FHWA/RD-80/190)

This report summarizes the efforts associated with trying to develop an empirical and experience based model pedestrian safety program for general application. The results of the study efforts to implement this model program in a test case city are documented.

HIGHWAY DESIGN AND TRAFFIC OPERATIONS

American Association of State Highway and Transportation Officials, A Policy on Geometric Design of Highways and Streets ("The Green Book"), Wash., D.C., AASHTO, 1984.

This handbook outlines the standards for the design and construction of urban and rural highways. The handbook provides guidelines for the situations where sidewalks are required and provides standards for their placement and width. The book provides information relative to the characteristics of the various groups of pedestrians for facility design purposes. It also provides guidelines for pedestrian crossings.

American Association of State Highway and Transportation Officials (AASHTO), Guide for Selecting, Locating, and Designing Traffic Barriers, Wash., D.C., AASHTO, 1977.

The guide indicates the proper design and placement of traffic barriers. Information is provided regarding the use of barriers to separate pedestrians from traffic.

Flora, John W. and Kenneth M. Keitt, Access Management for Streets and Highways, McLean, VA, PRC Voorhees, July 1982. (FHWA-IP-82-3).

The handbook outlines design standards for the location and features of driveways to serve land access needs. It also describes concepts and procedures for the control of access. The handbook does not, however, address the need to consider pedestrian movements along arterials and in the vicinity of traffic generators.

"Highway Capacity Manual", TRB Special Report 209, Wash., D.C., Transportation Research Board, 1985.

This document serves as the primary guide to analyzing the capacity of streets and intersections. This version of the manual provides for the first time a comprehensive treatment of pedestrian capacity. Procedures are provided for the analysis of capacity and level of service for sidewalks, crosswalks, and street corners. The procedures are based upon speed-volume-density relationships which have been established for pedestrian movement.

Institute of Transportation Engineers (ITE), Guidelines for Driveway Design & Location, Wash , D.C , ITE, 1985.

This document provides guidelines for driveway location and design for various types of area, street, and land uses. It outlines design considerations and elements in relation to traffic volumes. A set of recommended guidelines are provided covering basic driveways, major driveway design factors, and reservior space.

Institute of Transportation Engineers (ITE), Guidelines for Urban Major Street Design, Wash , D.C., ITE, 1979.

This document provides guidelines for the design of major streets. It covers the design elements of curves, tapers, curbing and clearances, grades, medians, lane control, intersections, channelization, transit, parking, driveways, sidewalks, bikeways, lighting, border areas, right of way, underground utilities, and speed control.

Institute of Transportation Engineers, Transportation and Traffic Engineering Handbook, Wash , D.C., ITE, 1982.

This handbook provides a general overview of the characteristics and operational features of various transportation modes including pedestrians. Most of the material in this document is focused upon walking rates, gap acceptance, volume-density relationships, and behavior of pedestrians.

JHK & Associates, Traffic Control Devices Handbook, Wash., D.C., U.S. Dept. of Transportation, 1983.

This handbook outlines a recommended practice for the installation of various forms of traffic control devices. It provides guidelines for the use of signs, pavement markings, and signals. It also outlines traffic control standards for work zones, school areas, railroad crossings, and bicycle facilities. The handbook also discusses the practices related to field studies, record keeping, and legal implications.

Proceedings of International Symposium on Neighborhood Traffic Restraints,

June 15-21, 1980. Council for International Urban Liaison, Washington, D.C.: 1980.

Includes the full text of papers presented and reports on the panel discussions, site visits, and talks given during a week-long symposium. The event brought together some 40 German and U.S. local, state, and Federal officials, traffic engineers, planners, and academics for an exchange of experiences related to neighborhood traffic restraint.

Reilly, William R., James H. Kell, and Iris J. Fullerton, Design of Urban Streets, San Francisco, CA, JHK & Associates, Jan. 1980. (FHWA TSR 80-204)

This document is oriented toward improved design standards and operational practices to achieve greater use of existing highway facilities. It outlines a systematic process for the development of pedestrian facilities as an integrated part of the highway system. The document describes various treatments including the use of grade separations to accommodate pedestrian movement.

Simkowitz, Howard; Lajos Heder; and Edward Barber. The Restraint of the Automobile in American Residential Neighborhoods. Washington, D.C.: U.S. Department of Transportation, Urban Mass Transportation Administration, Office of Service and Methods Demonstration, 1978.

Report prepared for the Urban Mass Transportation Administration on techniques used in residential parking permit programs and in reducing vehicular volume and speed in residential neighborhoods. Provides a number of case studies, the Arlington County residential-area parking ordinance, the per curiam decision upholding the constitutionality of that ordinance, and a table outlining residential area parking policies on 40 U.S. communities.

U.S. Department of Transportation (USDOT), Manual on Uniform Traffic Control Devices for Streets and Highways, Wash., D.C., USDOT, 1978.

The manual outlines a set of uniform standards for the design and application of traffic control devices. It outlines particular standards for the warning of pedestrian crossings, the use of pavement markings, refuge islands, school zone treatments, pedestrian signalization and other traffic controls related to pedestrians.

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