UNIVERSITY OF ALBERTA

AN EVALUATION OF PLANNED WALKWAY NETWORKS IN TWO EDMONTON NEIGHBORHOODS

By

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ALYCE ZITA CECILE WICKERT

A thesis submitted to the Faculty of Graduate Studies and Research in partial fulfillment of the requirements for the degree of MASTER OF ARTS.

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The undersigned certify that they have read, and recommend to the Faculty of Graduate Studies and Research for acceptance, a thesis entitled AN EVALUATION OF PLANNED WALKWAY NETWORKS IN TWO EDMONTON NEIGHBORHOODS submitted by ALYCE ZITA CECILE WICKERT in partial fulfillment of the requirements for the degree of MASTER OF ARTS.

Dr. P.J. Smith

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Date: 21 April 1993

To Eric and Drewie

Who were constant reminders
that there is life after thesis

ABSTRACT

This thesis examines the concept of comprehensive networks of separated walkways, the intention of which is to enhance the residential environment by providing safe and convenient pedestrian access to local service facilities. This concept was introduced in Edmonton in the mid 1960s, but then abandoned some ten years later.

The research evaluated the walkway networks of two Edmonton neighborhoods based on actual use patterns. The procedure was to determine how the walkways were being used and then to compare actual use with the intended uses outlined by the residential development plan. Four research objectives were framed: first, to determine the City of Edmonton's policies about residential walkway planning and how these policies changed; second, to examine actual use patterns and compare them with the objectives from the residential development plan; third, to examine the spatial use patterns to determine whether the walkways were providing access to service facilities; and fourth, to determine whether the walkways provided safe and direct routes for children walking to school.

The research showed that the network concept was abandoned for administrative and financial reasons, not because of concerns about the functional value of walkways in residential areas. Overall, use was more broadly based and diverse than the planners had originally envisaged. Children used the walkways a great deal, but so did adults and male teenagers; and although walking was prevalent, riding bicycles was also popular. Access was important to walkway use, but the prevalence of summer, evening, and weekend use, along with such activities as playing, walking dogs, and pushing baby strollers also indicated recreational pursuits. Finally, the network provided local and district-level access to facilities in one neighborhood but not the other; it did not provide convenient access to the elementary schools.

It was determined that the patterns of use in each neighborhood were affected by its specific walkway layout. In turn, the layouts in each neighborhood were affected by the practical difficulty of incorporating existing site features and providing access to both levels of service facilities. That the walkways were used a great deal, however, indicated that they were a valuable feature of the residential environment.

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The six planners who agreed to be interviewed for this thesis - Lynfa Jones, Kim Mackenzie, Keith Driver, Bra[illegible] M[illegible], Joe Creron, and [illegible] Prasad - were remarkable people to talk to. They supplied a great deal of interesting and insightful knowledge about residential walkway planning in Edmonton - past, present, and future.

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CHAPTER 1

INTRODUCTION

1.1 INTRODUCTION TO THE RESEARCH PROBLEM

This thesis concerns an important aspect of residential planning and design, namely, the concept of the comprehensive walkway network. Ideally, a thoroughly comprehensive network of pedestrian paths in residential areas must meet two basic requirements. First, at the scale of the individual neighborhood, it should extend to all parts of the neighborhood, linking each housing group to the path network, to other housing groups, and to the service destinations within the neighborhood. Second, at the larger community scale, it should extend from each neighborhood to those adjoining, and so on throughout the entire development area. That is, it must provide access to wherever residents want or need to go in their community. As a corollary, a network must also be both direct and safe. In fact, these two criteria are closely related. A direct walkway network not only provides convenient paths to wherever residents want to go, but by following the shortest routes between origins and destinations, it removes the need for dangerous or intrusive short-cutting. Above all, to meet the criterion of safety, a walkway network should be designed to minimize the risk of accidents between pedestrians and other kinds of traffic.

Concern for pedestrian convenience and safety has been an important aspect of residential planning and design theory for a long time. Planning theory since the 1920s has especially emphasized the convenience, comfort, and security of children walking to and from school as a central principle in the organization and design of new residential areas. Three notable figures in the development of the pertinent ideas were Clarence Perry, Henry Wright, and Clarence Stein. In Perry's neighborhood unit concept, for example, six principles were proposed, all of them directed toward increasing pedestrian safety and convenience in one way or another. Stein and Wright were motivated by similar concerns, and addressed them in their Radburn concept by physically separating pedestrian and vehicular traffic.

The combination of neighborhood unit principles and pedestrian/vehicular separation greatly enhances the quality of the residential environment from the pedestrian's perspective, and has had a major influence on residential planning and development in Canada.

In Edmonton, the idea of using comprehensive walkway networks in new residential development was first discussed by city planners during the 1960s, culminating in 1968 in the preparation of an official walkways policy. The walkway concept was then introduced into local practice in 1969 and 1970, and was widely used over the next 10 years. During this time one of the most notable design aspects of new residential walkway networks was the physical separation of pedestrian and vehicular traffic. Other walkway principles followed logically from this, particularly those that involved the safety, directness, and comprehensiveness of the networks. By the end of the 1970s, however, the separation concept had lost favor in Edmonton, and comprehensive walkway networks were no longer featured in the plans for new suburban areas. They were replaced by traditional sidewalks and short, minor walkways or pedestrian 'linkages', which were intended to provide local access to specific destinations such as bus stops, rather than comprehensive access to all areas of a neighborhood.

It is ironic that the walkway concept and the separation principle were applied in Edmonton for such a short time. Ideas that had been endorsed by planning theory since the 1920s finally came into practice in the 1960s, and then were discarded almost immediately. Not that Edmonton was alone in this. Although the separation approach continued to be recommended in textbooks and planning manuals (O'Mara, 1978; CMHC, 1981), a substantial body of criticism was emerging even as Edmonton's first walkways were being built (Polus and Craus, 1988). Especially in Europe, where the Radburn concept had had a more extensive practical influence than it ever did in North America (Parsons, 1992), some planners were coming to prefer an 'integration' approach, whereby vehicles and pedestrians were not segregated but shared the street surface (Tolley, 1989). Dutch planners led the way here, with the invention of the so-called 'woonerf' street in 1965, but similar ideas have been widely employed in Germany and Britain under the label of 'traffic-calming'

(Hass-Klau, 1990; Tolley, 1990). This particular concept has not had much influence in Edmonton, or anywhere in Canada for that matter (Mackey, 1990), but it is indicative of a general shift away from the separation approach and a search for more acceptable alternatives, a pattern that seemed to have been mirrored in Edmonton's experience.

It was against this backdrop that the research problem was conceived. The question, given the apparent enthusiasm and thoroughness with which the idea of separate walkway networks was embraced in Edmonton, was why it did not continue as the favored approach. Above all, was it because the concept itself proved to be unrealistic? That is, have Edmonton's walkways failed to live up to theoretical expectations, especially in terms of their use patterns? Just what use is made of the existing walkways, and how does that compare with the intentions of the governing plans and policies? These are the basic questions that the thesis attempts to answer through a detailed investigation of actual use patterns on a representative selection of Edmonton's walkways.

1.2 SELECTION OF THE STUDY AREA

The study area selected for the research comprises two adjoining neighborhoods within the suburban community of West Jasper Place: Thorncliff and Aldergrove (Figures 1.1 and 1.2). These neighborhoods are bounded by 87 Avenue on the north and by Whitemud Drive on the south, and they are separated by 178 Street. The eastern boundary for Thorncliff is 170 Street; the western boundary for Aldergrove is Anthony Henday Drive, the first section of the future ring road. The area west of 187 Street was a late addition, though. The land became available for development after the ring road right-of-way was realigned, but the walkway network was not extended beyond the original neighborhood boundary.

The first step in choosing the study area was to examine all the development plans prepared for new residential areas in Edmonton during the late 1960s and early 1970s. While many of them included walkways of some sort, only five proposed networks that met the requirements for comprehensiveness described in Section 1.1. These were West Jasper Place (1967), Riverbend/Terwillegar Heights (1969), Castle Downs (1970), Mill Woods (1971), and Clareview/The Hermitage (1972) (Figure 1.1).

Figure 1.1
Thesis study area - Edmonton context

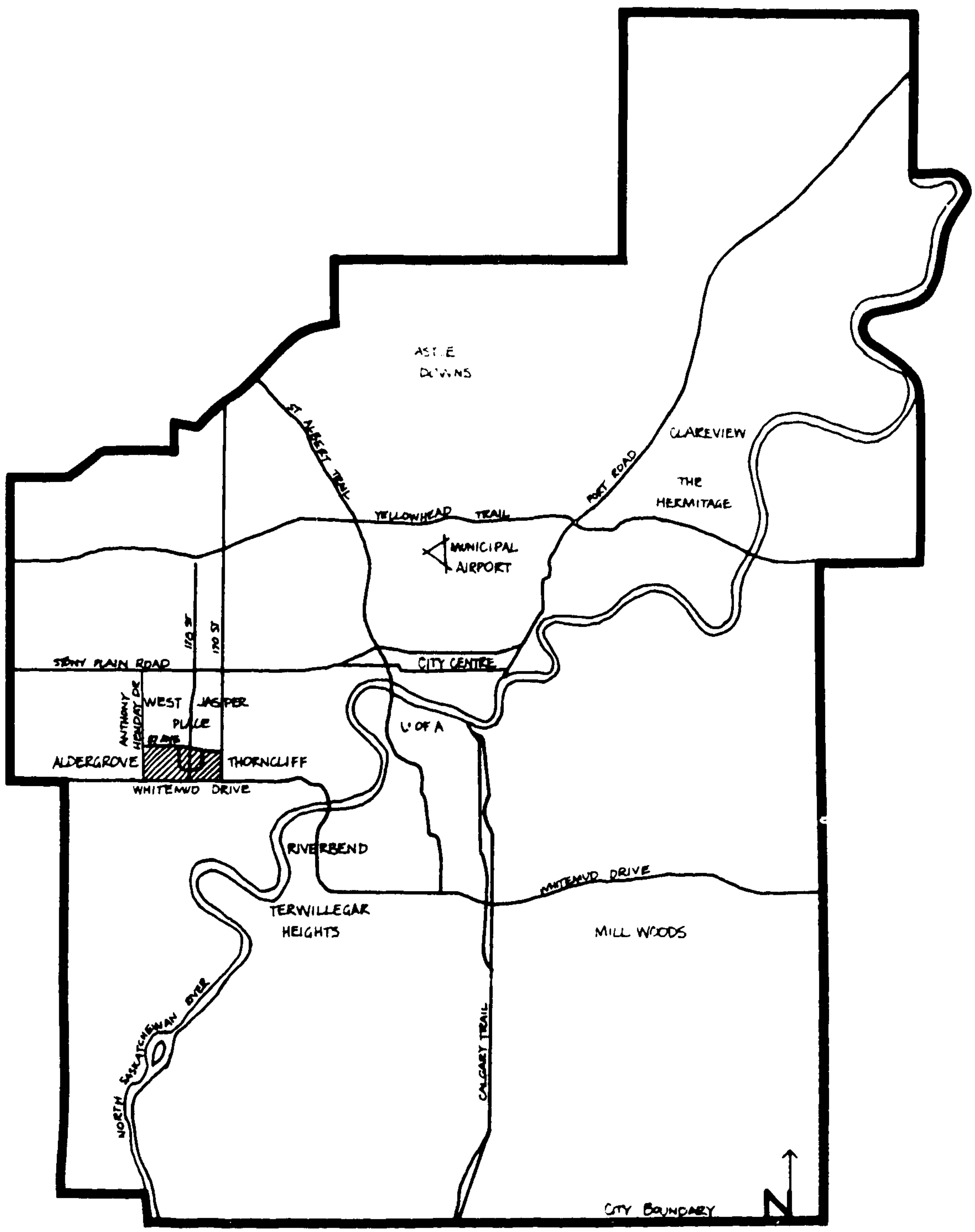
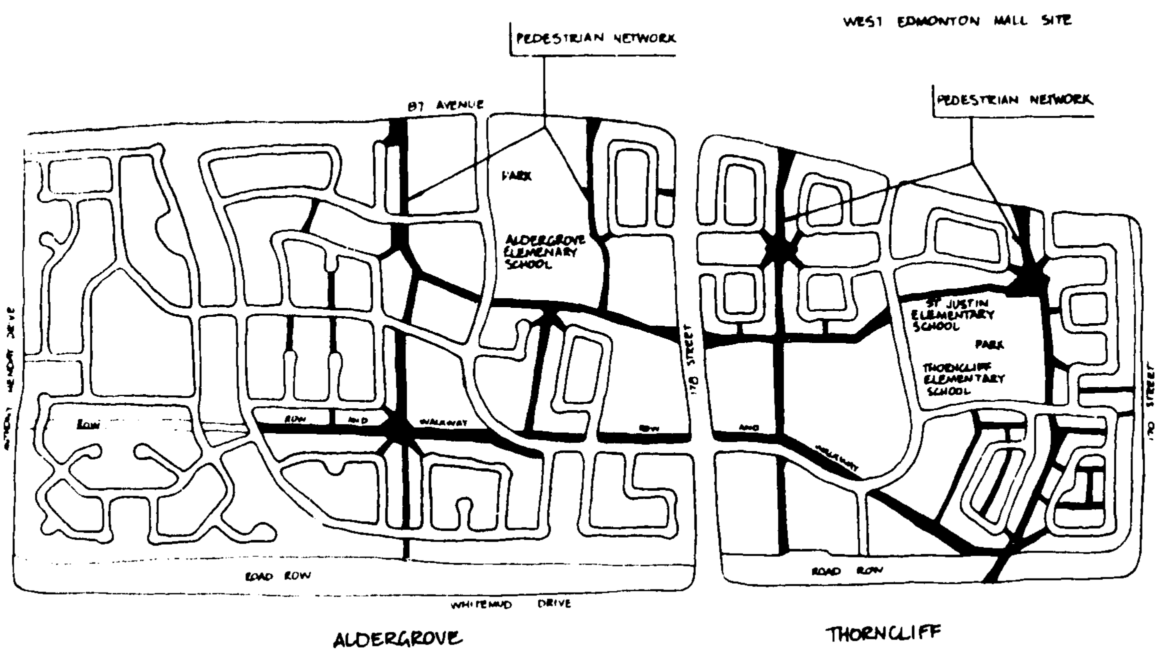


Figure 1.2
Thesis study area - neighborhood context



The next step was to conduct reconnaissance surveys of these five development areas. The surveys, which were carried out during May and June of 1988, showed that the suburban communities of Mill Woods and West Jasper Place had neighborhoods with the best potential for thesis purposes. That is, their walkway networks were the most comprehensive of all the surveyed residential areas and they seemed to have been deliberately planned to enhance pedestrian access, safety, and convenience.

Within each of Mill Woods and West Jasper Place, a group of four to six adjoining neighborhoods (i.e. one 'district') was selected for a second round of reconnaissance. These neighborhood groups were considered to be representative of walkway planning practice in Edmonton because their walkway layouts effectively applied both the walkway planning objectives described in their respective development plans and the general principles of walkway planning that are emphasized in the theoretical literature. Initially, the thesis study area was intended to comprise one district of four to six neighborhoods. However, the second round of field reconnaissance demonstrated that a practical study area had to be much smaller than that, so two adjoining neighborhoods were settled upon. Together they were large enough to provide an acceptable study base, yet small enough to be manageable for one full-time researcher and an occasional part-time helper.

The final choice of Thorncliff and Aldergrove was made for the following reasons:

1. The walkway networks within Thorncliff and Aldergrove were among the most comprehensive and direct of those found during the field reconnaissance.
2. It was evident that the two neighborhoods and their walkway networks had been planned on a combination of neighborhood unit principles and the Radburn concept, and so provided an appropriate basis for reviewing the application of theoretical ideas in the Edmonton context.
3. Thorncliff and Aldergrove are adjoining neighborhoods with continuous walkway connections which were originally intended to be part of a large-scale network covering the whole residential

area of West Jasper Place.

4. West Jasper Place was the first suburb in Edmonton to be subject to a plan that proposed a comprehensive pedestrian network for an entire residential development area, and Thorncliff and Aldergrove were two of its earliest neighborhoods. As a result, the application of the walkway network concept in these neighborhoods was truest to the original objectives of the West Jasper Place Plan, and so were best suited for comparison with those objectives.

1.3 RESEARCH OBJECTIVES

The specific research problem was to evaluate the walkway networks of Thorncliff and Aldergrove on the basis of their current use patterns; that is, to determine how effectively the walkways are used and how well they meet their intended or planned objectives. From that, in turn, it was hoped to be able to reach more general conclusions about the validity of the separated walkway concept as it was applied in Edmonton, as well as coming to a better understanding of the practical difficulties that may have operated against its continuing acceptance.

To these ends, four research objectives were framed. These objectives then set the major elements of the research plan and each became the subject of a separate chapter.

1. To determine exactly what policies the City of Edmonton has followed with respect to the planning of walkway networks in new residential areas, and how and why those policies changed over time (Chapter 3).
2. To assess the overall levels of use of the walkway networks in Thorncliff and Aldergrove, and to compare the actual use patterns with the original policy objectives. The general question here is whether the walkways attract the amounts and kinds of use that the planners envisaged (Chapter 4).
3. To assess the spatial patterns of walkway use within Thorncliff and Aldergrove. The larger purpose in this case was to determine whether the planning principle of providing convenient pedestrian access to neighborhood service

facilities was evident in the actual use patterns (Chapter 5).

4. To assess the use that elementary school children from Thorncliff and Aldergrove make of the walkways on their daily journeys to school. This relates to a longstanding concern in planning practice: namely, that children should not have to walk far to reach their schools and that their routes should be both direct and safe from traffic hazards (Chapter 6).

1.4 RESEARCH METHODS

Four distinct data collection methods were used for this thesis: documentary research, interview research, observation research, and a mapping survey. The individual methods of collection and analysis relevant to each research component will be described in detail in their appropriate chapters, but the assumptions and ideas upon which these methods were based are described in this section.

1.4.1 Documentary and Interview Research

The first objective addresses the transition through which residential walkway planning in Edmonton progressed between the mid 1960s and the late 1970s. A detailed review of all the relevant planning documents, both area plans and more general policy statements, was the first requirement, but it was decided to conduct personal interviews with a small sample of Edmonton planners as well. This, it was thought, would be the best means of learning directly about the Edmonton experience with planning for pedestrians in residential areas. While the responses were understandably subjective, they were also considered to be the informed opinions of acknowledged experts, because all of the planners who were interviewed had been involved in residential development in Edmonton since at least the 1970s. I therefore wanted to know how they regarded the concept of separated walkway networks as it was applied in Edmonton, why they thought the local policies that governed its use were changed, and how they felt about the concept as an ideal of new residential development from today's perspective.

1.4.2 Observation Research

The second objective addresses the general issue of frequency or intensity of walkway use, not just in total, but by different kinds of users and for different kinds of activities. Its informati[illegible]ds were satisfied through an observation procedure which provide[illegible] detailed record of actual walkway use in the two study neighborhoods. While the end purpose of this part of the research was to compare existing use with the intended use outlined by the planning documents, I also wanted the results to show more than just basic age and sex characteristics of walkway users. I wanted to know what kinds of activities occurred on the walkways because that would tell me more about the people who were using them and what they wanted from the walkways. I also wanted to know how frequency of use and activity patterns varied throughout the day, week, and year, because that would add to the evaluation of network versatility and effectiveness.

The same observation data set was used to satisfy the third objective, which addresses the relationship between the existing users and the study neighborhoods' service destinations - the schools, parks, and convenience stores. To do this, the data were reorganized into traffic volume maps so that they could show where walkway use was concentrated in the neighborhoods. I wanted to know how the layout of the walkways affected the relationship between users and local service destinations as indicated by the spatial patterns of intensity of walkway use. I particularly wanted to know whether people used the walkways for access purposes, and if the networks were well designed for that end.

1.4.3 Mapping Survey

The fourth objective addresses walkway use by school children. It was satisfied by administering a combined mapping and questionnaire survey to a sample of students attending the two elementary schools in the Thorncliff neighborhood. The survey required the children to draw the routes they took to school that day to create a one-time representation of their general route selection. They also answered two questions concerning how they got to school on the day of the survey and why they took that particular route. I wanted to know how well the general planning objective of providing direct, convenient, and safe routes to school had translated into actual walkway use patterns. Although the principle is easily stated, it is another thing to build walkways that actually meet the planning objective.

1.5 ORGANIZATION OF THE THESIS

The thesis is divided into seven chapters. Chapter 1 sets the framework by outlining the research purpose, the thesis study area, the research objectives, background to the research methods, and the general organization of the thesis.

Chapter 2 provides an overview of the historical development of walkway planning theory and practice. It is divided into three sections, each of which comprises a stage in the development and understanding of residential walkway planning theory. Then a synthesis of residential walkway planning theory and its application was provided by describing eight principles of residential walkway planning. These principles were later used to highlight the essential components of walkway planning theory applied to new residential areas in Edmonton described in Chapter 3. The chapter concludes with a brief review of the integration approach to planning for pedestrians, an approach that has raised serious questions about previous methods of pedestrian planning.

Chapters 3, 4, 5, and 6 are the four analytical chapters, each corresponding with one of the research objectives outlined in Section 1.3. Chapter 3 focuses on Edmonton's approach and contribution to residential walkway planning from the mid 1960s to the late 1970s. Chapter 4 examines observed walkway use based on temporal, user, and activity patterns. Chapter 5 also examines observed use, but this time it is based on use patterns in relation to local service destinations. Chapter 6 focuses on walkway use by local elementary school children. After the introduction, the first major section of each chapter outlines the research methods that were used in the analysis of each objective. It included two aspects of research: first, the theoretical basis for the particular method of research used in each case (except the interviews) and why that particular method was chosen for that purpose; and second, the specific data collection method and the method of analysis that was used in each case. However, since the analyses of Chapters 4 and 5 were both based on the observation data, the first aspect of the research for both chapters is described in Chapter 4. Then the research methods section in Chapter 5 outlines the second aspect. Subsequent sections of each chapter present the results from the analyses of the data. At the end of each chapter, the results are summarized and an attempt is made to answer the particular research objective being analyzed.

Chapter 7 is the concluding chapter. It provides a summary of the results from the four analytical chapters and answers the four corresponding research objectives. It also attempts to explain why these results occurred and their implications for walkway planning in Edmonton.

CHAPTER 2

THEORY AND PRACTICE OF PLANNING FOR PEDESTRIANS IN NEW RESIDENTIAL AREAS

2.1 INTRODUCTION

The purpose of this chapter is to understand the historical development of walkway planning theory and practice, and to show how aspects of three influential concepts - the neighborhood unit, Radburn, and cluster development - were used to advance the planning of separate walkway networks in new residential areas. This review of the theoretical literature leads to a description of the basic principles of walkway planning in the residential environment. The chapter concludes with a brief description of an alternative approach to planning for pedestrians, the so-called integration approach, that challenges the validity and usefulness of the separation principle.

2.2 FOUNDATIONS OF WALKWAY PLANNING THEORY

2.2.1 Early Contributions

This discussion focuses on three people whose ideas and experiences were of greatest significance to the initial development of walkway planning theory and practice in residential areas - Frederick Law Olmsted, Barry Parker, and Raymond Unwin.

First, the separation of pedestrian and vehicular circulation began with garden planning in mid-19th Century Britain. While restricted pedestrian and vehicular access was provided to gardens before this time, their layouts emphasized the aesthetic aspects of a naturalistic and picturesque landscape rather than traffic circulation. By the 1840s and 1850s, however, plans for public garden parks were becoming utilitarian as well as picturesque. Park maintenance and easy access for pedestrian and carriage traffic were increasingly important to park designers, as demonstrated at Birkenhead Park, Liverpool (1844), the most important park built during this period. It was one of the first public parks specifically designed to provide extensive and separate circulation systems for pedestrians and carriages while maintaining the aesthetic qualities of a naturalistic garden (Chadwick, 1966; French, 1973; Cranz, 1978).

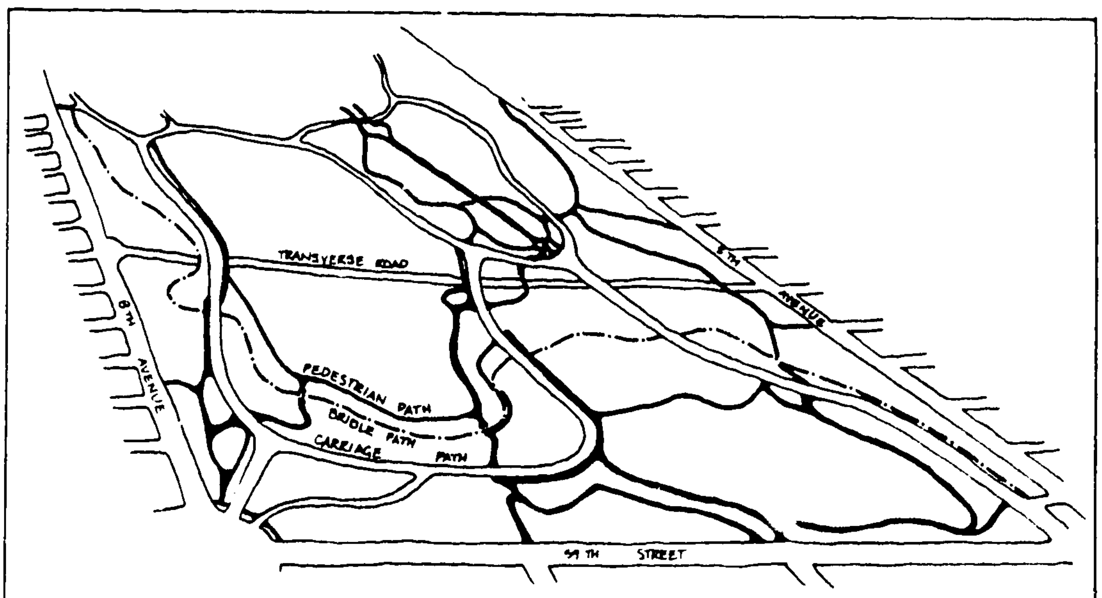
Frederick Law Olmsted, the renowned American landscape architect, was impressed by the Birkenhead Park design, and especially by the concept of separate circulation networks for different kinds of traffic. In 1858, in partnership with Calvert Vaux, he devised the 'Greensward Plan' for Central Park, New York City, which expanded on this concept in several important respects (Figure 2.1). Above all, it introduced three ideas that are especially pertinent to the thesis inquiry.

First, Olmsted and Vaux's design separated internal and external traffic by depressing roads for vehicular traffic that crossed the park. Next, it separated internal park users by providing different pathways for pedestrian, equestrian, and carriage traffic. Overpasses and underpasses provided further separation where the paths intersected one another or crossed the transverse roads. Third, the internal pathways in Central Park were intended to satisfy a recreational purpose in their own right. While the paths gave access to the various park facilities, they also provided the means by which city residents could go for leisurely walks through a natural and pleasing landscape (Chadwick, 1966; Cranz, 1978).

The circulation network used in Central Park provided both vertical and horizontal separation of different traffic modes, something never before considered in park planning. The result was greater pedestrian safety and enjoyment within the park without sacrificing the speed and continuity of vehicular traffic crossing the park. This idea of physically separating pedestrian and vehicular traffic in the park setting would later become an important component of residential planning theory. In particular, according to Lewis Mumford, "Olmsted's complete separation of pedestrian walks from vehicular and horseback traffic...was certainly the major forerunner of the Radburn plan" (Stein, 1957:16).

The next step in the development of walkway planning theory and practice was contributed by two British architects, Barry Parker and Raymond Unwin (Creese, 1966; Cherry, 1972; Jackson, 1985; Hall, 1988). Like other social reformers at the turn of the century, such as William Morris and Ebenezer Howard, they sought to improve the living conditions

Figure 2.1
Circulation systems in Central Park, New York,
based on Olmsted and Vaux's plan of 1858
(adapted from Stein, 1957:47))



of the working classes by improving their physical environment. Initially, Parker and Unwin's work involved designing small cottages which were intended to be inexpensive to build and hence affordable for working class occupants. Their designs soon expanded, however, to include neighborhood and town layouts. Here they introduced the superblock and the cul-de-sac street and adapted Olmsted's traffic separation principle to the residential environment. In the 1902 plan for New Earswick, Yorkshire, for example, "...cottages [were] disposed in terraces grouped either around communal greens, or along pedestrian ways..." (Hall, 1988:99). The housing terraces were accessible from dead-end streets or culs-de-sac and the communal greens were created by grouping housing around the perimeter of a large block of land, the first superblock.

Although the walkway concept was effectively transferred from the park setting to the residential environment at New Earswick, the short, disjointed paths used there could not be compared with the extensive and comprehensive networks found earlier at Central Park, or later at Radburn. In fact, Parker and Unwin's footpaths were never intended to be more than short connections between housing groups or culs-de-sac. Unwin's sketch plans for Hampstead Garden Suburb (1905-1908) similarly showed short footpaths, or 'pedestrian alleys' (Briggs, 1957), which joined culs-de-sac between cottage groups, or connected cottages to green spaces. He also developed a hierarchical circulation system at Hampstead, which went from "...roads and streets to the lane and way, then to the pedestrian close and walk, and finally to mere paths" (Creese, 1966:239). Later, this system was criticized because it hampered traffic movement, but it was deliberately designed to improve pedestrian safety and convenience, not to facilitate vehicular traffic (Creese, 1966).

While Olmsted, Parker, and Unwin were responsible for important design experiments in walkway planning, modern theory depends largely on the advances and refinements that were made by three American planners: Clarence Perry, Henry Wright, and Clarence Stein. The walkway planning principles essential to this research are derived from the two most influential residential planning theories of the 20th century - Perry's Neighborhood Unit formula, and Stein and Wright's Radburn concept.

2.2.2 The Neighborhood Unit Concept

Clarence Perry was a sociologist-planner who developed his 'formula' for the ideal neighborhood unit from close personal observations of his home neighborhood, Forest Hills Gardens in New York City. From these observations, Perry concluded that the single most important component of neighborhood life was the community center, and with it, the local elementary school. From a physical planning standpoint, one of Perry's primary concerns was the convenience and safety of pedestrians within the neighborhood, and above all, children walking between their homes and the local school (Perry, 1929 and 1939). He proposed six principles of neighborhood unit planning (Figure 2.2), all of them directed toward increasing pedestrian safety and convenience in one way or another. These principles addressed the size of the ideal neighborhood unit, its boundaries, the location of community institutions and commercial areas, the street layout, and the provision of recreation and park spaces.

First, the size of each neighborhood was based on the catchment area of the local elementary school, located with other community institutions at the point of maximum accessibility (or approximate center) of the neighborhood. One-quarter mile (0.4 kilometers) was considered to be the maximum distance that children should have to walk between their homes and the local school.

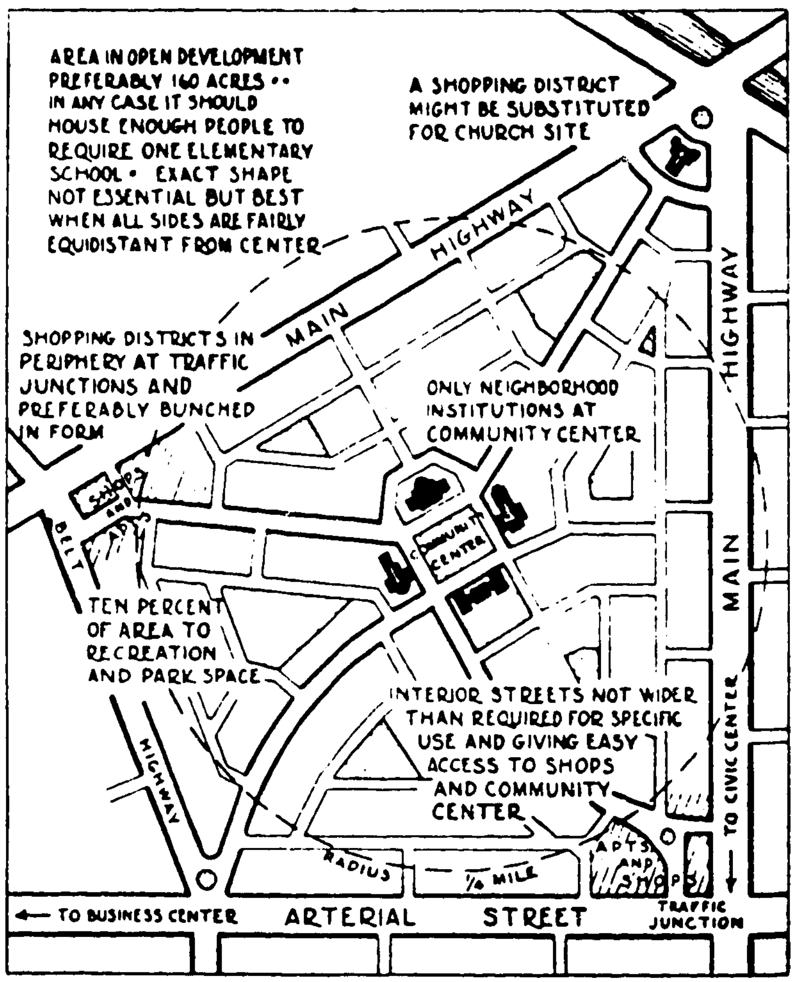
Second, clear and distinct boundaries were to be established around the neighborhood. These boundaries were best formed by arterial streets so that non-local traffic would be encouraged to use the wider and faster perimeter streets rather than the local streets.

Third, all community institutions and facilities, such as the local elementary school, the public library, churches, and public recreation facilities, were to be centrally located in the neighborhood to provide maximum accessibility for all residents.

Fourth, the local convenience shopping areas were to be grouped at the main entrances to the neighborhood, rather than at the center. This location made it unnecessary for non-local business traffic to travel on neighborhood streets, while ensuring reasonably convenient pedestrian access for neighborhood residents.

Fifth, the traditional grid street layout was to be modified into a

Figure 2.2
Perry's Neighborhood Unit formula
(Perry, 1929:88)



curvilinear form so that internal streets could accommodate local traffic needs, but non-local traffic would be deterred from entering the neighborhood. Perry was envisaging a simple hierarchical organization, in which vehicular traffic would be channeled from lower order (local) residential streets to higher order streets (collectors), then led away from the neighborhood (by arterials) to other areas of the city. Under this scheme, the residential streets would have the lowest possible traffic volumes because they would serve only to carry local traffic.

Sixth, 10% of the developable site area was to be dedicated to recreation and park space. Since a curvilinear road system uses less land than a grid layout, the open space could be obtained with no loss of building lots. It was to be used for such facilities as school playfields, tennis courts, a community or civic square, and small ornamental parks and playgrounds.

Pedestrian safety and convenience in the residential environment were addressed first through the hierarchical road network and the channeling of through traffic onto boundary streets. These two design elements discouraged penetration by non-local traffic, which was diverted around the neighborhood on arterial streets. Pedestrian safety was increased because residents could walk anywhere within the neighborhood without encountering heavy traffic at street crossings or on local streets. Second, since all community institutions were centralized, the limited neighborhood size ensured that local facilities were always within easy walking distance. Commercial areas were located at the periphery of the neighborhood so that large volumes of business traffic would not be drawn onto local streets, but pedestrian access from within the neighborhood was still reasonably convenient, again because of the limited neighborhood size. The combination of centralized facilities and restricted size was especially important to local children because they could walk safely and easily from their homes to the elementary school without having to cross busy streets.

2.2.3 The Radburn Concept

In 1924, Clarence Stein and Henry Wright, two American architect-planners, met with Raymond Unwin while visiting Britain. As it turned out, each had something to learn from the other. Stein and Wright were to use superblocks, culs-de-sac, and the hierarchical circulation system in their plan for Radburn; Unwin adapted his footpaths to incorporate Olmsted's principles of grade-separation and pathway specialization (Rasmussen, 1957; Creese, 1966; Jackson, 1985).

In preparation for their ultimate goal of building an American garden city, Stein and Wright first undertook to plan and develop an experimental project in 1924 at Sunnyside Gardens, New York City. Sunnyside became the research laboratory for the residential and walkway planning ideas that received their full expression at Radburn in 1929.

At Sunnyside, Stein and Wright were limited by local development regulations which had previously laid out a standard grid street system over the entire site. Nonetheless, it was within this framework of rectangular blocks that Stein and Wright first experimented with the idea of moving houses to the edge of a block to provide an interior open space (Figure 2.3). This was the precursor to the Radburn superblocks.

Walkways through the common space removed local residents from the threat of outside vehicular traffic when walking, but they were not open to outsiders. Rather, they were designed to provide residents with access from each row house or apartment building to all local facilities. For example, since parking was not provided on the sites with the houses, the walkways provided connections to the parking garages two or three blocks away. In addition, the housing units were turned around so that living rooms and bedrooms faced the interior open spaces while service entrances and work areas (e.g. kitchens) faced the street. Finally, landscaping screened the interior from outside disturbances and further enhanced the quality of the residential environment (Stein, 1957).

After the success of Sunnyside, Stein and Wright turned to a 'greenfields' site at Radburn, New Jersey. Here, they wished to plan an entire new town that would be secure and pleasant for residents, while allowing for the increasing role of the automobile (Stein, 1957; Hall, 1988). The design of Radburn (Figure 2.4 A) was a logical extension of the residential planning experiment at Sunnyside. Without the constraint of a pre-imposed grid street system, Radburn's layout could readily accommodate Stein and Wright's design innovations. For example, rather than providing

This figure was removed because of copyright restrictions.
It is a plan of typical blocks at Sunnyside Gardens, New York City.
The source is Stein, 1957:29.

These figures were removed because of copyright restrictions.
Figure 2.5 A is a site plan of Baldwin Hills Village, Los Angeles.
Figure 2.5 B is an enlarged view of
a garden court and a garage court at Baldwin Hills Village
The source for both is Stein, 1957:192 and 201

parking garages two blocks away, vehicular traffic had direct access to the housing units via culs-de-sac and loop streets which were set around the perimeters of the superblocks.

By clustering the housing on these minor streets, the interior of each superblock could be left as a large irregular open space, forming a continuous system of parkland throughout the community. The intention was to build the houses so that living rooms and bedrooms faced inwards, while service rooms faced the streets (Figure 2.4 B). This orientation was to provide direct visual and physical access from every house to the interior open space and to the network of pedestrian paths within it. Although very few of the houses built at Radburn actually looked into the parkland, the interior paths nonetheless provided pedestrian access from every house to all parts of the superblock, and from one superblock to the next. Neighborhood facilities, such as schools and recreational areas, were incorporated into the open space system so that they were more directly accessible to residents through the path network than by the roads. Where the paths crossed the higher-order streets that bounded the superblocks, pedestrian tunnels were built, reminiscent of Olmsted's in Central Park 70 years earlier.

The network of pedestrian paths that linked the superblocks at Radburn formed a comprehensive, community-wide system. It provided pedestrian access to local facilities within each neighborhood and to higher-level facilities, such as the town center and the rail transit station. Conflicts between pedestrians and vehicles at both the neighborhood level and the community level were greatly reduced because walkways were physically separated from the street system, horizontally within the superblocks and vertically by means of underpasses at street crossings.

The neighborhood unit and Radburn are closely connected concepts, and not only because they were developed at about the same time. Neighborhood unit theory outlined what Perry felt were the six essential components in planning a good residential environment. There was a standard form of Perry's principles that came to be widely applied, but that was based on development norms that were not essential to the theory, particularly concerning the treatment of streets and the relationship between house and street. At Radburn, by contrast, Stein and Wright proposed and built a radically different form of neighborhood. It incorporated Perry's neighborhood unit principles, but replaced conventional residential design norms with new principles, such as separating pedestrian and vehicular traffic, using superblocks with central open spaces, and turning houses to face the interior parks. In addition, Stein and Wright initiated the ideal of a hierarchical organization to walkway planning in new residential development. The separate pedestrian network not only extended throughout individual superblocks, it also joined superblocks within each neighborhood, and neighborhoods throughout the town.

2.3 APPLICATIONS AND REFINEMENTS IN SUBSEQUENT PLANNING PRACTICE

Although the neighborhood unit and Radburn concepts were both developed in the 1920s, it was a long time before they were thoroughly integrated in the planning and design of new residential areas. Whereas Perry's general principles were widely followed in residential planning and development from the 1940s on, the more radical Radburn concept - and the principle of separating pedestrians from vehicular traffic - won acceptance more slowly, especially among land developers. Until the 1970s, when the cluster housing concept came into popular favor, Radburn had limited practical influence. Its chief applications were in the design of large multi-family housing projects and in new town planning. Examples of both applications will be described here.

2.3.1 Application of the Radburn Concept to the Design of Multi-Family Housing Projects

In the United States, the Radburn approach to pedestrian planning first made its influence felt at two scales of urban development - in complete new towns such as Greenbelt, Maryland, and in individual housing projects, such as Baldwin Hills Village, Los Angeles. More importantly, both Greenbelt and Baldwin Hills were rental housing projects built with financial assistance from the United States government. They resulted from a desire to provide low-income earners with well-made, inexpensive housing in a healthful, pleasant setting during the depressed economies of the

1930s and early 1940s. Only the Baldwin Hills case will be described here, but the same general principles were followed at Greenbelt (Stein, 1957).

Baldwin Hills Village was built in 1941 on what was then the outskirts of the City of Los Angeles. Under the plan, an entire neighborhood was accommodated on a single large superblock (Figure 2.5 A). An open layout was retained by increasing housing density from single-family units to clusters of row houses and walk-up apartments. The land that was saved by this procedure was used to create an open space system at the interior of the superblock. A walkway network throughout this open space connected all the housing groups to one another and to the garage courts, the garden courts, and the central Village Green.

The Radburn culs-de-sac became garage courts at Baldwin Hills (Figure 2.5 B) in recognition of the need for covered parking, storage, and an area to do manual tasks such as repair work. While pedestrians could move freely throughout the neighborhood, vehicular traffic was restricted to the garage courts around the perimeter of the site. Fencing and vegetation screened the courts from view and prevented children from playing there. Like Radburn, the service entrances of the housing units faced the garage courts, while living areas and bedrooms faced the garden courts or interior open space. Interestingly, while the primary purpose of the walkways at Baldwin Hills was access, they were also used for leisure-time pursuits. In Stein's view, many adult residents liked to stroll around the interior open spaces because they provided a calming, orderly, and spacious feeling (Stein, 1957).

The contemporary significance of Baldwin Hills Village lies in its application of the Radburn concept to a different residential form than the single-family detached units at Radburn. The Baldwin Hills project provided multi-family rental units in medium-density buildings clustered around garage courts rather than culs-de-sac. While Baldwin Hills is a good example of modified Radburn form, its design did not completely integrate Radburn ideas with the neighborhood unit concept. For example, there is no school or community center as the focus of the neighborhood, and the walkway network is limited to the single superblock; it does not join Baldwin Hills to other nearby neighborhoods or even to the shopping center on the block between Sycamore and La Brea avenues (Figure 2.5 A).

Figure 2.5 A
Site plan of Baldwin Hills Village, Los Angeles
(Stein, 1957:192)

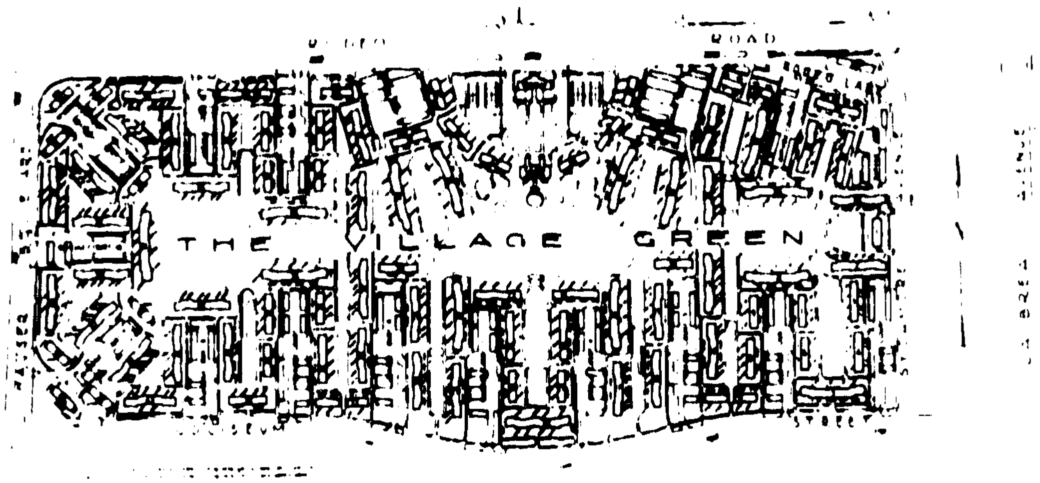
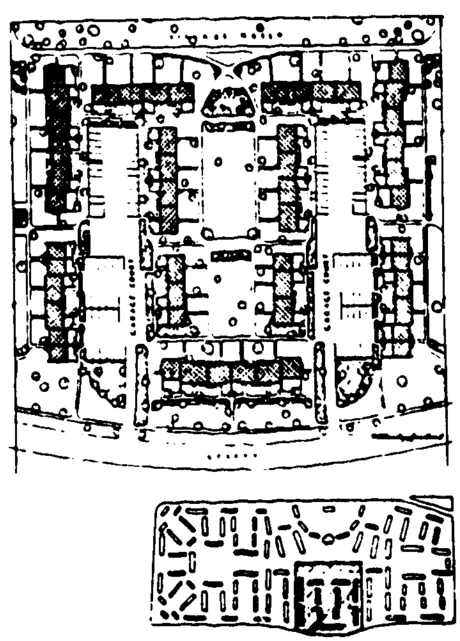


Figure 2.5 B
Enlarged view of a garden court and garage court
(Stein, 1957:201)



Nonetheless, Baldwin Hills Village was an extremely influential prototype, in the sense that superblocks with peripheral parking or garage courts have become the standard form for individual multi-family housing projects, in Europe as well as in North America.

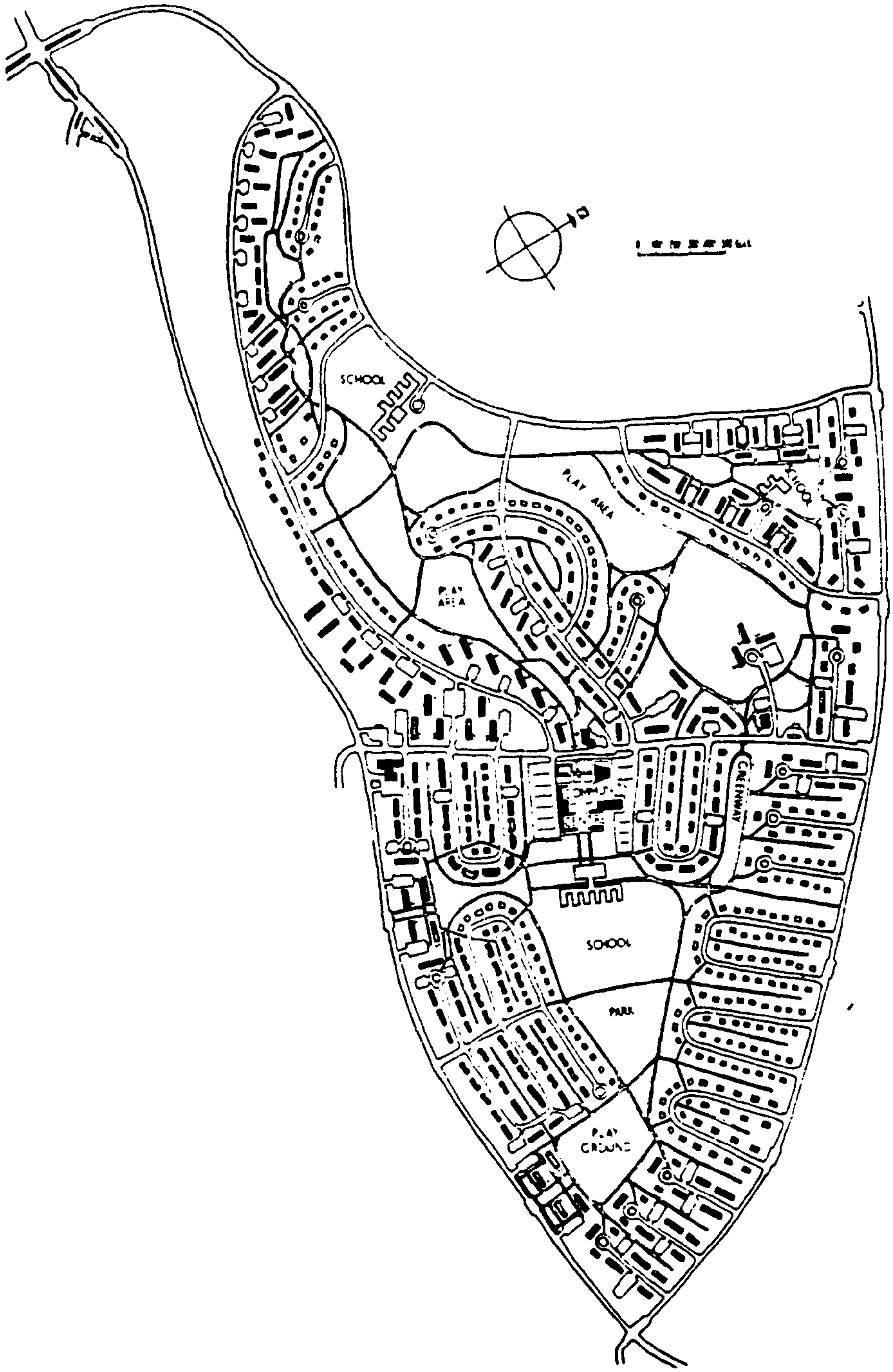
2.3.2 Application of the Radburn Concept to New Town Planning

The Radburn approach to planning for pedestrians has also been applied to the development of complete new towns, with the characteristic mix of housing types and densities. In general, two sets of circumstances have necessitated this scale of development. The first involves the need for an entire new settlement, built to provide housing for workers who service special facilities or industries in remote areas. The second involves the need to relocate a portion of an existing population from a large, congested city to an outlying area, such as in British new town planning after the Second World War (Carver, 1962).

An example of the first type of new town planning is Kitimat, British Columbia (Shaw, 1970). It was started in 1952 to house workers for the Alcan Aluminum Company on a remote site north of Vancouver. Kitimat is a noteworthy example of this form of development, partly because Clarence Stein was a planning consultant on the project, and partly because it was one of the earliest instances in North America where a definite neighborhood structure that followed all of Perry's principles was effectively combined with the Radburn form. Since the town of Radburn was never completed, its walkway network never achieved full extension throughout the community. Kitimat was therefore the first North American town built on neighborhood unit principles with a comprehensive network of pedestrian paths.

The first residential area built at Kitimat is illustrated in Figure 2.6. It is comprised of two adjoining neighborhoods, each incorporating a small number of large superblocks. Housing is clustered around the periphery of the superblocks on looped and cul-de-sac roads. The centers of each superblock are left as large open spaces. Within them a walkway network extends from housing clusters to the school grounds and community facilities at the focus of the neighborhood, to other housing clusters, to playgrounds, and through underpasses from one neighborhood to the next.

Figure 2.6
Initial residential development at Kitimat, B.C.
(Community Planning Review, 1952:79)



The walkways were deliberately made wide enough to accommodate pedestrians, bicycles, and snow removal equipment. The result is effective year-round use by residents.

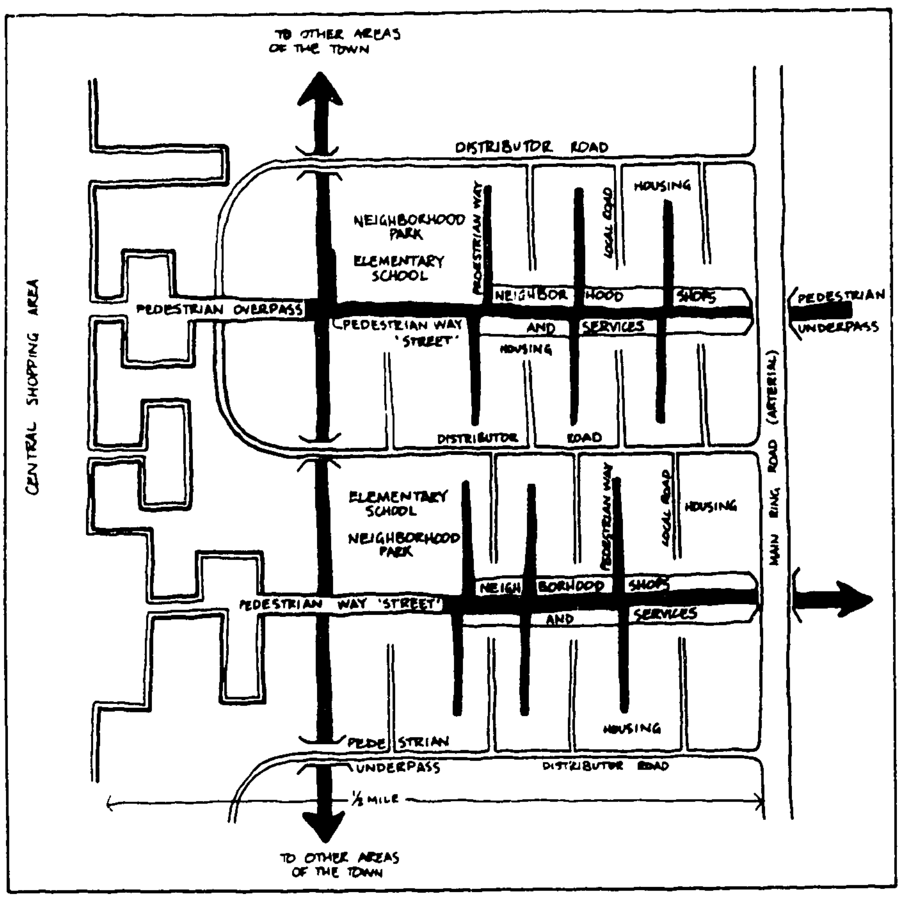
The second type of new town development is illustrated by the plan for Hook, Hampshire (near London), prepared in 1961. Like Kitimat, the plan for Hook was also based on neighborhood unit and Radburn concepts. In fact, Radburn principles were followed in most, if not all, the new towns that were built during this post-war period throughout Britain, Europe and the United States (Parsons, 1992). Although Hook was never built, it is an interesting example of new town development because it has a more rigid, geometric form than the normal 'organic' new towns like Kitimat. As such, it shows the adaptability of the Radburn principles.

Under the plan, a linear central shopping area was the focus of the town. It was comprised of a long, narrow deck which accommodated pedestrians while keeping out all vehicular traffic. Extending in perpendicular spines from this central area were paths that formed pedestrian-only 'streets' down the center line of each neighborhood. This is illustrated in Figure 2.7, a schematic drawing of two of the proposed neighborhoods. Located along the pedestrian streets were to be neighborhood-level services and facilities such as the local elementary school, local shops, clinics, nursery schools, playgrounds, and public meeting rooms. Each neighborhood was also a superblock. Culs-de-sac and loop roads extended from perimeter distributor roads to provide access to the housing groups clustered around them. Then each house was joined to the local pedestrian street network which, in turn, joined each neighborhood to the central shopping area, to other neighborhoods, to employment areas, and to the outlying greenbelt. Underpasses and overpasses were intended to carry pedestrian traffic across the distributor and arterial roads on their way to other areas of the town.

2.3.3 Application of the Radburn Concept to the Planning of New Suburbs

In addition to the large-scale networks of new towns such as Kitimat and Hook, the Radburn approach to pedestrian planning has been used in the planning of entire new suburbs on the outskirts of large cities. This scale of residential development was introduced by Carver (1962) in his

Figure 2.7
Two neighborhoods directly adjoining
the central shopping area in Hook, Hampshire
(adapted from London County Council, 1961:39)



theory of suburban towns, or 'cities in the suburbs'. His idea was to replace typical incremental residential development, illustrated by the neighborhood unit form, with much larger, self-contained suburban communities. The theory grouped several neighborhoods together around a town center, the new focus of the residential area. Often an intermediate or 'community' level of development was added as well, between neighborhood and 'town'. This scale of residential development produced a concentrated population large enough to support high-order services and facilities, such as regional shopping centres, high schools, and health care facilities (Carver, 1962).

Within these new suburban units, walkways were built to connect all three levels of residential development, using Stein and Wright's ideas about hierarchical organization. At the lowest level, walkways were built to join all areas within a neighborhood. Then they were extended from one neighborhood to another within the community, and finally, to other communities throughout the whole suburb.

An excellent, if incomplete, example of this form of large-scale walkway planning in new suburbs is Mill Woods in southeast Edmonton (Bayne, 1992). The suburban town is comprised of eight communities, arranged in a three-by-three square. Within each community are two to four neighborhoods, each with a population of 3,000 to 4,000 residents. The originally projected population of Mill Woods was between 100,000 and 120,000 residents - the size of a fairly large town. The eight communities surround the town center, which includes regional-level services such as a shopping mall, a hospital, a combined high school and recreation complex, a district park, a community college, and other services found in most towns this size. In the plan, a comprehensive separate walkway network was designed to join all three levels of residential development. It was intended to connect all neighborhoods throughout each community, and then join them to the town center. The complete network was never realized, however, for reasons discussed in Chapter 3.

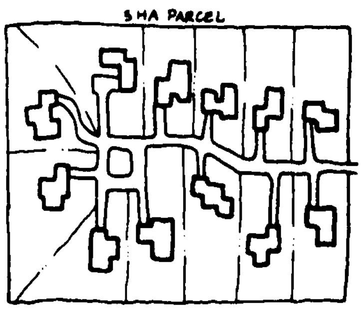
2.3.4 Modification of the Radburn Concept to Cluster Development

The next phase in the evolution of planning for pedestrians in the residential environment involved the modification of the Radburn and neighborhood unit concepts into the form known as cluster development. While the plans for Baldwin Hills Village, Kitimat, and Hook all used clustering to some degree, it is only since the 1960s that the concept has become a dominant feature of modern residential design.

The theory of clustering can best be illustrated by starting at a small scale, as in a single housing group around a cul-de-sac (Figure 2.8). In the top diagram, an entire 3-hectare parcel is fully developed using 12 low-density, single-family units, typical of many contemporary residential layouts. The center diagram shows how half of the parcel can be left undeveloped simply by building the same 12 houses on smaller lots. These are 6 duplexes, each containing 2 single-family attached units. While the net density on the 1.5-hectare site is doubled, gross density remains at 4 dwelling units per hectare, the same as in the top diagram. In the bottom diagram, net density is increased still further by clustering the dwellings into a medium-density development which requires an even smaller site. The diagram shows town houses clustered into 4 groups of 3 single-family attached units. As a result, only 0.75 hectares of the parcel is occupied by buildings and the remaining 2.25 hectares is left for open space. Increasing the net density of development on the residential parcel allows a portion of it to be freed for open space, which also provides an ideal setting for a local pedestrian network.

In larger residential developments, houses under the cluster plan are grouped around culs-de-sac, rather than spread uniformly over the entire parcel. While the housing clusters have smaller lots and higher densities than are usually specified in zoning regulations, other parts of the development site have no houses at all. Overall, the gross density for the cluster plan parcel complies with the local zoning regulations for residential development (O'Mara, 1978; Sanders, 1980). It is crucial, of course, that the land saved by clustering be set aside for open space or common use; it must not be used for more housing units (Sanders, 1980). Part of the idea of clustering is to create an environment where houses are grouped onto the most suitable building areas, and natural or sensitive areas are left alone. The land saved by clustering, over and above the natural areas, can then be used to create a continuous open space network throughout the residential area without compromising the

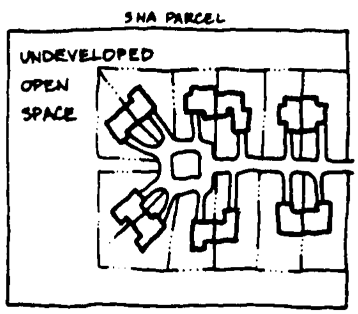
Figure 2.8
Clustering around a cul-de-sac
(adapted from Land Design/Research Inc., 1976:24)



LOW-DENSITY SINGLE-FAMILY DETACHED

12 DWELLING UNITS ON A 3 HA SITE

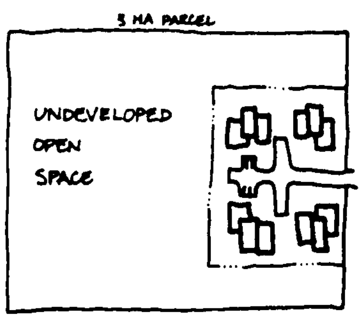
- 4 DU/HA GROSS
- 4 DU/HA NET



LOW-DENSITY SINGLE-FAMILY ATTACHED

12 DWELLING UNITS ON A 1.5 HA SITE

- 4 DU/HA GROSS
- 8 DU/HA NET



MEDIUM-DENSITY SINGLE-FAMILY ATTACHED

12 DWELLING UNITS ON A 0.75 HA SITE

- 4 DU/HA GROSS
- 16 DU/HA NET

overall density of the development or the profits of the developer (Land Design/Research Inc., 1976; O'Mara, 1978; Sanders, 1980). The individual open spaces which were initially only around a single cul-de-sac or loop road now occur around every cluster of houses throughout the residential area. This open space network, in turn, facilitates the provision of a continuous walkway network, just as it did at Radburn.

A typical cluster-plan neighborhood is illustrated in Figure 2.9. It shows some obvious similarities with Perry's theoretical diagram (Figure 2.2) - the use of arterial roads as boundaries, and the peripheral location of traffic generators for example - but its form also differs in vital respects. Above all, the use of culs-de-sac and housing clusters allows the internal street network to be greatly simplified. A single collector loop and a few secondary loops or subcollectors provide efficient access into all parts of the neighborhood, while channeling traffic in a way that minimizes the potential for conflict with pedestrians. Because there are comparatively few streets, comparatively few pedestrian crossings are needed. At the same time, the walkway network is designed to channel pedestrian traffic to the designated crossing points, while linking all parts of the neighborhood as directly as possible with the major local destinations, and with adjoining neighborhoods.

An enlargement of one segment of the typical cluster-plan neighborhood (Figure 2.10) shows the relationship between walkways and housing clusters in more detail. This sub-neighborhood unit is similar to the Radburn superblocks, except that the culs-de-sac and their clusters of housing extend outside as well as inside the residential loop road. Similarly, the open spaces and walkway network occur both within and outside the loop road. As a result, the uniform superblocks from Radburn have been turned inside out by cluster development. Instead of clustering all the houses around the periphery of the superblock as at Radburn, the houses are clustered on the most suitable parts of the site. Natural site features are easily retained and incorporated into the overall development, creating a more desirable environment for residents. The boundaries of individual superblocks become less defined because clustering creates a much more organic form where the open space and

Figure 2.9
Walkway network in a typical cluster-plan neighborhood unit
(adapted from Richman, 1979:449)

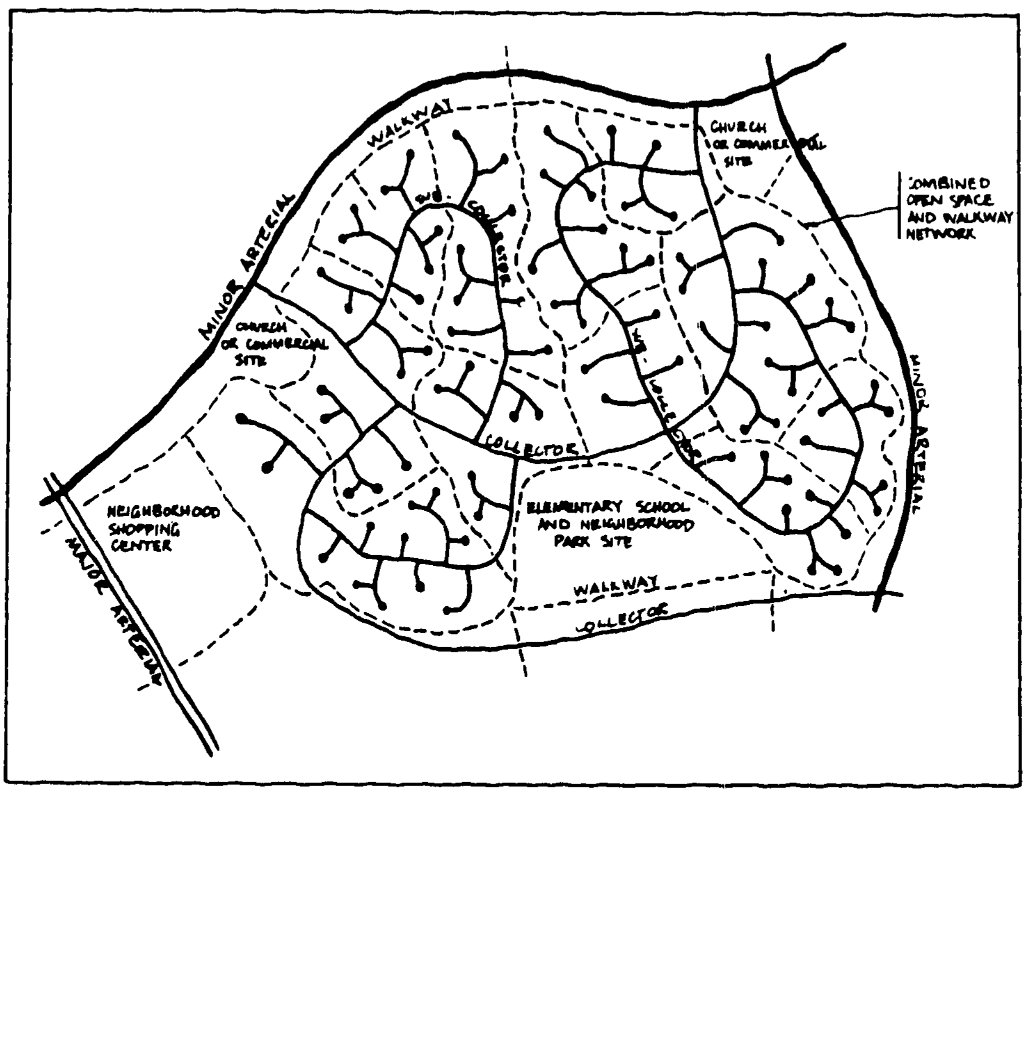
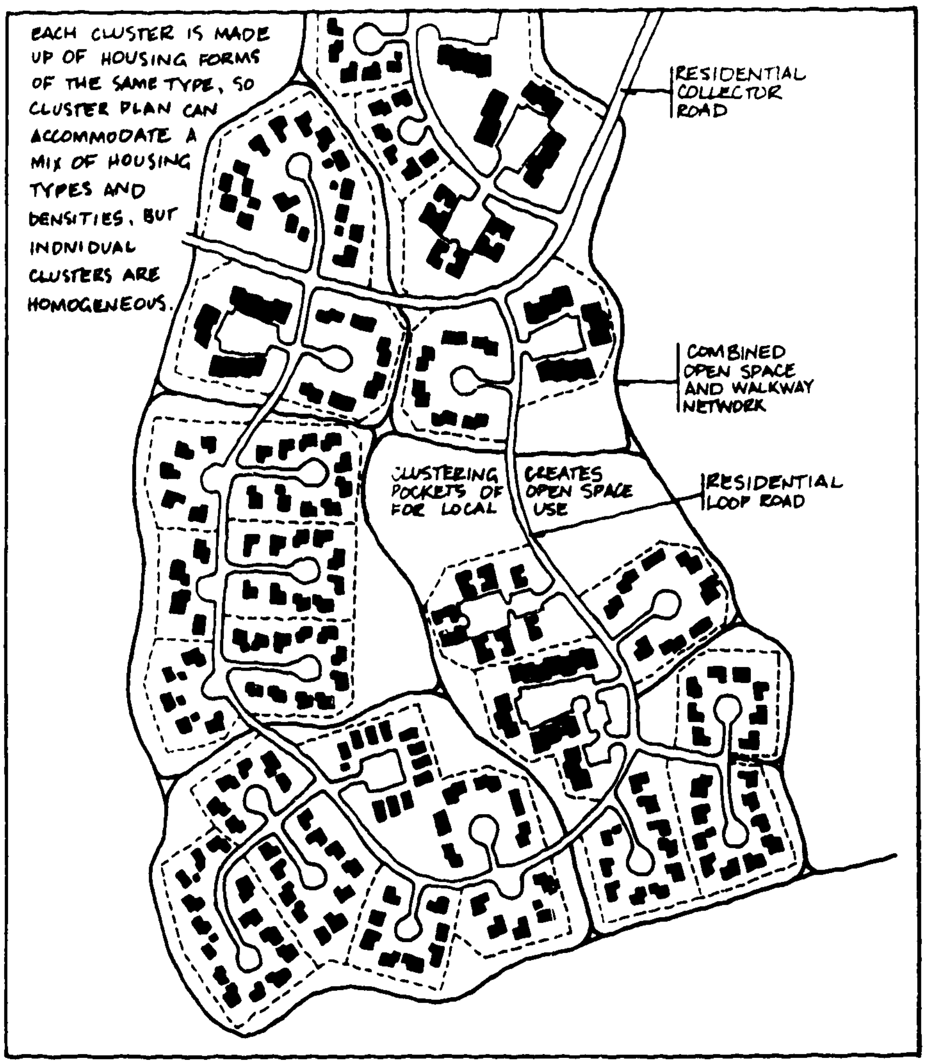


Figure 2.10
Typical segment of a cluster-plan neighborhood unit
(adapted from Land Design/Research Inc., 1980:31)



walkway networks flow between and around the clusters of housing. Still, the walkway network provides access from each housing cluster to all areas of the neighborhood, and from one neighborhood to another.

In summary, the three residential planning theories - Radburn, neighborhood unit, and clustering - have augmented each other to produce innovative forms of residential development in which safe and convenient pedestrian networks are a central goal. The Radburn concept incorporated neighborhood unit principles, using them in a new and different physical form. Then, cluster development further modified that physical form, primarily to accommodate contemporary ideas about street layout, such as looped streets, continuous collectors, and subcollectors. The neighborhood unit, Radburn, and clustering concepts have significantly affected contemporary residential planning and design ideals.

2.3.5 Walkway Planning Principles Under the Separation Approach

Eight principles of walkway planning have been derived from the theoretical literature described above, particularly as they relate to pedestrian safety and convenience in the residential environment. Besides these specific principles, pedestrian safety and convenience are also addressed through the general notions of comprehensiveness and directness that are fundamental to residential walkway planning theory. A thoroughly comprehensive network of pedestrian paths should extend to all parts of a neighborhood and from one neighborhood to another, throughout the entire development area. That is, it should provide access to wherever residents want or need to go in the community. Furthermore, the pedestrian network must be direct. This means it should not only provide convenient paths to wherever residents want to go, but the paths should be laid out by the shortest possible route between the two points. This comprehensive and direct walkway network should also be safe in the sense that it should be consciously designed to minimize the risk of accidents between pedestrians and other kinds of traffic. In fact, safety, directness, and comprehensiveness are interrelated components of good walkway design. For example, a comprehensive network that provides direct access to all parts of the neighborhood will increase pedestrian safety because dangerous or intrusive short cuts are avoided. On the other hand, a comprehensive network that is not direct may actually increase the risk of accidents because people may begin to use short cuts rather than the walkways.

In summary, the eight principles that stand out from the theoretical literature are as follows:

1. pedestrian and vehicular circulation should be separated;
2. walkway networks should be focused on service destinations within the neighborhood;
3. all houses and housing clusters should be directly connected with these service destinations through the walkway networks;
4. pedestrian flows should be channeled onto the walkway networks using logical and functional path layouts;
5. pedestrian traffic should be channeled to controlled crossing points where walkways and streets intersect;
6. neighborhood walkways should be connected to other neighborhoods, creating networks at both the neighborhood level and the community level of development;
7. open spaces, landscaping, and walkways should be integrated with one another;
8. walkways should be designed to be suitable for both access and leisure-time pursuits.

2.4 AN ALTERNATIVE TO SEPARATION - THE INTEGRATION APPROACH TO PLANNING FOR PEDESTRIANS

Despite the widespread influence of the neighborhood unit, Radburn, and cluster development on planning for pedestrians in new residential areas, there was a significant change in general attitudes about the appropriate treatment of pedestrians in neighborhood design, starting around 1970. Some planners began to move away from the 'separation approach' to the idea that pedestrian and vehicular traffic should both use the same street surface - the 'integration approach'. This was partly in response to difficulties that planners had with the whole principle of physical separation, and partly in response to ever-increasing vehicular traffic in residential areas. Although it is generally agreed that residential areas with segregation schemes have had good pedestrian accident records, they have also demonstrated serious drawbacks. These include the hazards of children playing in parking areas, problems with access to service facilities, high capital and maintenance costs (Cowley, 1967; Polus and Craus, 1988), and concerns about public safety on isolated pathways (Tolley, 1989). In addition, planners who support the integration approach feel that full physical separation of pedestrians from vehicles is not necessary to ensure their safety. It is possible to compel motorists to drive slowly in residential areas, using complex and imaginative traffic restraint schemes, so that pedestrian safety can be achieved without segregation and its associated problems (Ramsay, 1990).

The concept of integrating pedestrian and vehicular traffic on the same road surface was developed in 1963 by Nick De Boer, Professor of Urban Planning at the University of Emmen in the Netherlands. His design suggestions for streets in the new town of Emmen provided a means to "...overcome the contradiction between children playing and car use in urban streets" (Hass-Klau, 1990). He used cul-de-sac streets that were deliberately arranged to make motorists feel as though they were driving in their own yards; hence the name 'woonerf', meaning residential yard. The primary objective of De Boer's woonerf streets was to promote pedestrian priority over vehicles. The streets were therefore designed to force motorists to adjust their normal driving behavior, particularly by reducing speed.

De Boer's woonerf concept was originally intended to be applied at the scale of the new town, but in reality it has been used almost exclusively in redevelopment schemes for older residential areas. Planners in Holland, not surprisingly, were the first to take this approach, beginning in Delft in the early 1970s. The concept then spread to Germany and Britain, again to be used in the remodelling of older residential areas. In Germany, the concept is called Verkehrsberuhigung, meaning traffic-calming; in Britain, it is referred to as shared-surface roads (Hass-Klau, 1990; Tolley, 1990). As with the original Dutch applications, the intention has been to improve existing residential areas and make them safer for pedestrians by modifying selected neighborhood streets. Those streets best suited to woonerf redesign were fairly short (up to 250 meters) and had relatively low traffic volumes (100-200 vehicles per hour).

To achieve the goal of a safe walking environment, planners and other city officials (particularly in Holland and Germany) felt it was necessary to designate a woonerf or traffic-calmed street in legal terms, which included the use of special signs at the entrance and exit. Since part of the woonerf idea was that there would be no curb to separate the street surface from the sidewalk, pedestrians had to be given priority over vehicles along the entire woonerf road. In addition, pedestrians were further protected through a range of traffic-restricting devices. Foremost among them was a new lower speed-limit, intended to compel motorists to travel at a 'walking pace', though there has been an ongoing debate about the meaning of that term. Many planners feel that 30 kilometers per hour is appropriate for a traffic-calmed area (Tolley, 1989 and 1990), while others feel 15 kilometers per hour or less is essential (Hass-Klau, 1990). Nonetheless, local bylaws were drafted and enforced so that motorists would be legally obligated to follow the local restrictions of the woonerf street.

Along with reduced speed limits, all woonerf streets employ some kind of traffic restraint scheme; the most effective have included a combination of various speed-restricting devices. These intentionally change the physical layout of the street, which reduces the space on the street for vehicles, and thus forces them to slow down. These physical changes include shifts in the axis of the road to create sharp bends along its length, change of street character using 'sleeping policemen' (ramps, speed humps, and raised platforms), deliberate bottlenecks at road junctions, parking spaces at right angles to traffic flow, low-level vegetation in planters, street furniture, children's play areas in the street, and pedestrian-level lighting. It is considered crucial, however, that the combined physical elements of the woonerf street do not restrict sight lines for vehicles so that pedestrian safety will not be compromised (Polus and Craus, 1988; Tolley, 1989 and 1990; Hass-Klau, 1990).

The larger implication of this practical experience is that it is now clearly understood that the separation approach is not the only way of accommodating pedestrians in the residential environment. Nor is it necessarily the best way, at least in the minds of those planners who regard integration as a safer, cheaper and generally more effective alternative. Even in Canada, where traffic-calming measures have not been widely used and are still not well-known (Mackey, 1990), there is no longer the enthusiasm for complete separation that was so evident among planners of the postwar generation. That, in turn, raises doubts about the success, validity, and long-term desirability of those residential areas that were planned according to the separation approach, doubts that give the thesis research its focus.

CHAPTER 3

THE CITY OF EDMONTON'S APPROACH TO PLANNING FOR PEDESTRIANS

3.1 INTRODUCTION

This chapter addresses the first research objective - to determine exactly what policies the City of Edmonton has followed with respect to the planning of walkway networks in new residential areas, and how and why those policies changed over time. With this in view, Edmonton's approach to planning for pedestrians from the late 1960s to the present was examined. Over this period, the comprehensive walkway concept rose to popularity and was applied to many new residential areas, but then was suddenly abandoned.

The first section of this chapter reviews the methodological components of the research. In this case, the primary sources of information were planning documents and interviews with professional planners. The second section outlines the results from the analyses of these two sources. It attempts to explain how and why planning for pedestrians changed in Edmonton by dividing the findings into four areas of analysis: 1) initial development of walkway policy, 2) initial application, 3) changes in approach and policy, and 4) changes in attitude. The implications for the research plan are drawn out in the final section.

3.2 RESEARCH METHODS

Edmonton's approach to planning for pedestrians was examined using two research methods - a review of planning documents and interviews with professional planners. These methods served distinct but closely related purposes. The planning documents were the primary source of information about the initial development of the walkway concept in Edmonton, and its close dependence on the theoretical principles described in Chapter 2. Diagrams of proposed new residential areas in these documents illustrated how the theory translated into practice, and how this practice changed after the early 1970s. The interviews then supplemented the information compiled from the planning documents. In some cases, the interview findings helped confirm my understanding of the documents; at other times, information was provided by the planners that was not available from the documentary sources.

3.2.1 The Planning Documents

The analysis of documentary sources started with an examination of all the residential development plans prepared in Edmonton from the late 1960s to the early 1980s. Most of the plans from this period included walkways of some sort, ranging from comprehensive networks to short linkages. The outline plans for Riverbend-Terwillegar Heights (1969), West Jasper Place (1967, 1972), the Clareview area of Northeast Edmonton (1969, 1972), Castle Downs/North Edmonton (1970, 1982), Casselman-Steele Heights (1971), and Mill Woods (1971) were most pertinent, but a number of area structure plans were reviewed as well. They were the plans for West Jasper Place South (1978), Edmonton Northeast (1980), Castle Downs North (1982) and Edmonton Northwest (1983). Since all these plans had to conform to City guidelines and policies for development, Edmonton's General Municipal Plans (1971 and 1981) were examined, as were several walkway policy statements and studies written by City of Edmonton planners (see bibliography). The most valuable of these was Walkways in Residential Areas, a statement of policy guidelines for developers that was issued in 1968 (Edmonton, 1968).

3.2.2 The Interviews

To ensure that the planners chosen for the interviews would be representative of local views about Edmonton's walkway planning efforts, it was important to try to satisfy two conditions. First, since past and present walkway planning policies were going to be compared, the interviews had to include planners who had been involved in residential development from at least the 1970s to the present. Second, to provide a balance between public and private planning perspectives, the number of interview subjects was to be equally divided between the public and private planning sectors. The original number of interviews was to be limited to four planners - two public and two private. In the end, however, this was increased to six, for reasons outlined below. These six were Kim Mackenzie, Mackenzie Associates; Keith Driver, Keith Driver and Associates Consulting Group Limited; Brant Mohr, City of Edmonton Land Development (Planning); Joe Creron, City of Edmonton Parks and Recreation; Lynfa Jones, City of Edmonton Parks and Recreation; and Braj Prasad, City of Edmonton Parks and Recreation.

While the two private planners who met the criteria were found quickly, the public planners were more elusive because few of the present staff were employed by the City of Edmonton during the early 1970s. It also proved difficult to reach planners from the City Land Development Department (Planning) because inquiries about walkways in residential areas were referred to the Transportation Planning Department or the Parks and Recreation Department. In the end, much of the information came from three planners in the parks and recreation department; their combined experience covered planning policies toward residential walkway development from the early 1970s to the present. A planner from the City Land Development Department was also interviewed, but since he had been hired by the City in the mid 1970s, he was able to comment only on the period when the walkway concept was beginning its decline in popularity. Nonetheless, all four public planners provided very similar information, whereas the private planners offered a quite different perspective on residential walkway planning in Edmonton.

Initial contacts were made with some of the interview subjects in November 1990 to determine their availability and willingness to participate in the research. The next contacts were made in January 1991. At this point, a brief description of the overall research problem and a preliminary list of the interview questions (Appendix 1) were sent to three of the interview subjects. The other three were enlisted while I was conducting the initial interviews. All six interviews were completed over two days in February 1991.

The list of topics for the interviews was preset, but the questions were open ended. Wherever possible, the planners were encouraged to elaborate on their responses or to provide additional information (e.g. documents) to supplement the discussion. Every interview began with the following general question to provide an overview of the planner's knowledge about walkway planning and design in Edmonton:

> "Please relate to me your knowledge about when walkway networks became popular in Edmonton, why you think they became popular at that time, how they developed and evolved during the 1970s, and why their use declined by the late 1970s?"

While the planners were responding to this, the following questions were introduced at appropriate opportunities to draw out more specific information:

1. Who first introduced the walkway concept, and why was it introduced at this particular time?

2. What was the intended function of the walkways when they were first introduced?

3. What was the initial reaction toward walkways by those involved with designing, building, and maintaining them? How did this change during the mid 1970s and why?

4. What was the city policy regarding walkway development in the late 1970s and early 1980s? What is it today? Has the function of walkways changed since that time?

5. Would it be possible for the original walkway concept to be reintroduced into residential development today? If not, how would it have to be altered to be effective and acceptable for everyone involved? What would be the function of new walkways?

The shortest interview lasted approximately 50 minutes and the longest was about 2 hours and 15 minutes. Notes were written throughout the interview period and great care was taken to ensure the planners' views were recorded accurately. During the interviews, the notes were reviewed with them periodically so that they could clarify points or make corrections where necessary. After the interviews were finished for the day, the notes were reviewed to further clarify the planners' statements and to add my comments and insights about what they were saying and why they said it.

3.3 PLANNING FOR PEDESTRIANS IN EDMONTON

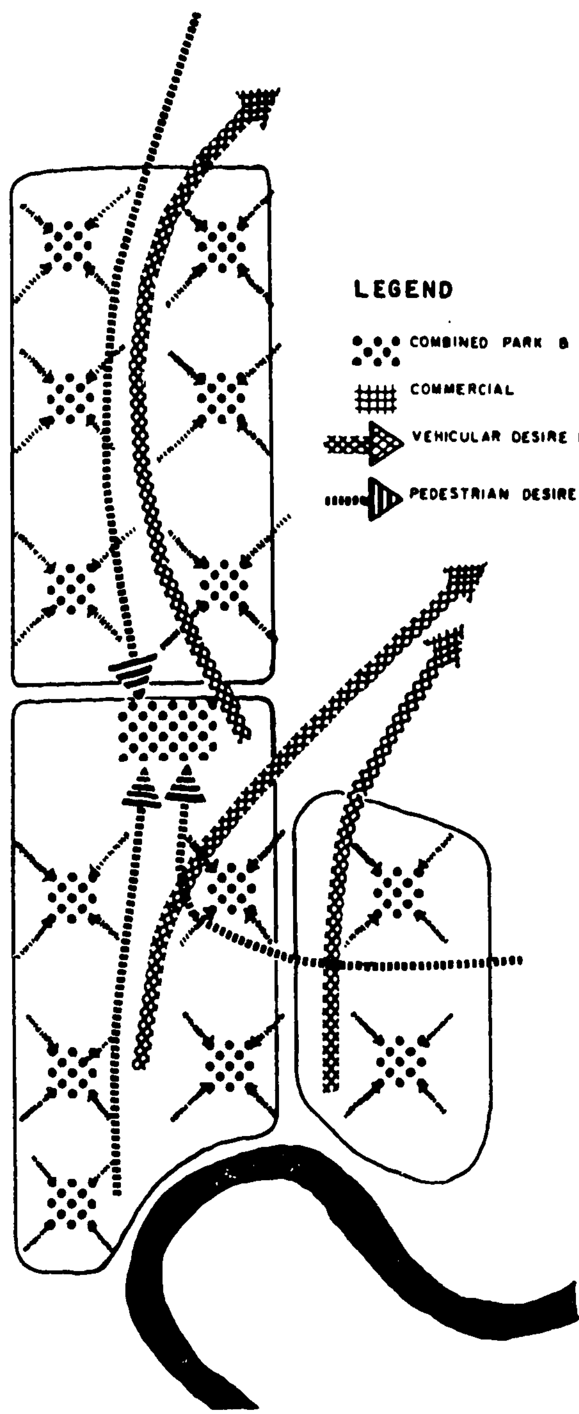
This section combines the analysis of the documentary sources and the interviews to trace the development of Edmonton's walkway planning policies, their application to new residential areas, and subsequent changes, both in practice (through the physical development of new residential areas) and in attitude (through the planners' comments about the walkway concept). The interpretation of the first interview question will be presented in Section 3.3.1, the second in Section 3.3.2, and the third, fourth, and fifth in Section 3.3.4.

3.3.1 Initiation of Residential Walkway Planning Policy

Planned walkway networks for new residential areas in Edmonton were first mentioned in the City's draft general plan of 1967. In the residential chapter, for instance, "...planning for the pedestrian in relation to the school and park systems, local shopping centres, bus routes, etc." was emphasized, and at least one firm principle was laid down: "Paved walkways should be constructed and, where necessary, pedestrian overpasses provided for safety and convenience if a major roadway is adjacent to pedestrian generating land uses" (Edmonton, 1967a:5.5). Pedestrian circulation was also addressed in the roadways and transportation section of the general plan: "Pedestrian movement...should receive priority where concentration of activity is so high that more convenient access can be provided by these means than by any other. Appropriate instances include movement within neighbourhoods..." (Edmonton, 1967a:12.8).

Shortly after the draft general plan was released, the City's urban design group prepared the plan for the new 'suburban town' of West Jasper Place (Edmonton, 1967b). It was the first residential development plan in Edmonton in which a well-developed proposal for a comprehensive and separate pedestrian network was presented. The importance of comprehensiveness is illustrated by the fact that planners wished to lay out a "footpath system...which leads from the dwellings to the local schools, then on to the ravines, major open spaces and recreational facilities" (Edmonton, 1967b:35). The plan also maintained the fundamental principle of separating pedestrian and vehicular traffic throughout the residential area. The purpose here was to reconcile two conflicting traffic flow patterns common to residential areas at that time: to permit safe and direct pedestrian circulation within neighborhoods while also facilitating vehicular movement in and out of them (Figure 3.1). Safety

Figure 3.1
Hypothetical desire lines of pedestrians and vehicles as envisaged in the West Jasper Place plan (Edmonton, 1967b:np)



and directness were two crucial objectives in the layout of the pedestrian networks under the plan:

> "The pedestrian system must be designed essentially to connect the housing-groups to the local elementary school.... But it must be designed so as to provide more direct access to facilities, than does the road system. Only in this way will these public walkways, rather than the verges of the roads, be intensively used for pedestrian circulation.... (Edmonton, 1967b:50, emphasis in text)

The plan even went so far as to suggest the types of users for which these networks were intended; they were aimed at that segment of the population that did not own or drive a car, namely, children of both school and preschool age, elderly people, and housewives of one-car families:

> "The pedestrian system is purposely intended...to provide a pleasant route for children going to school; a route which will be safe from pedestrian-vehicular conflicts.... Safe 'tot lots' for pre-school children must be provided very near to, and easily accessible from, the home. The adult pedestrian must also not be forgotten. Neither the senior citizen walking from dwelling to bus stop, nor the housewife popping out to the local store for a pound of coffee, should be required to hazard long or dangerous routes" (Edmonton, 1967b:50-51 and 61).

A schematic of the first three neighborhoods proposed for development in West Jasper Place summarizes the key planning ideas (Figure 3.2). The pedestrian network was separated from the road network; pedestrian traffic was to be channeled towards service destinations within each neighborhood along logical and functional paths (safe and direct); the network was comprehensive - i.e. each neighborhood path was part of a larger system of paths, as in Stein and Wright's hierarchical organization; and the road layout and grouped housing reflected clustering ideas, Edmonton's first attempt at such a development initiative. The land saved by clustering and the curvilinear street pattern provided the open space needed for the pedestrian network. Existing site features, such as pipeline rights-of-way and blocks of trees, were to be integrated with the open space and walkway networks. Although the stated purpose for these networks was access to local facilities, the lower drawing in Figure 3.3 illustrates that planners envisioned some degree of recreational use as well, notably in the form of 'tot lots' located along the walkways; none were ever built, though.

Figure 3.2
Proposed pedestrian circulation in West Jasper Place
at the neighborhood and community levels
(adapted from Edmonton, 1967b:64)

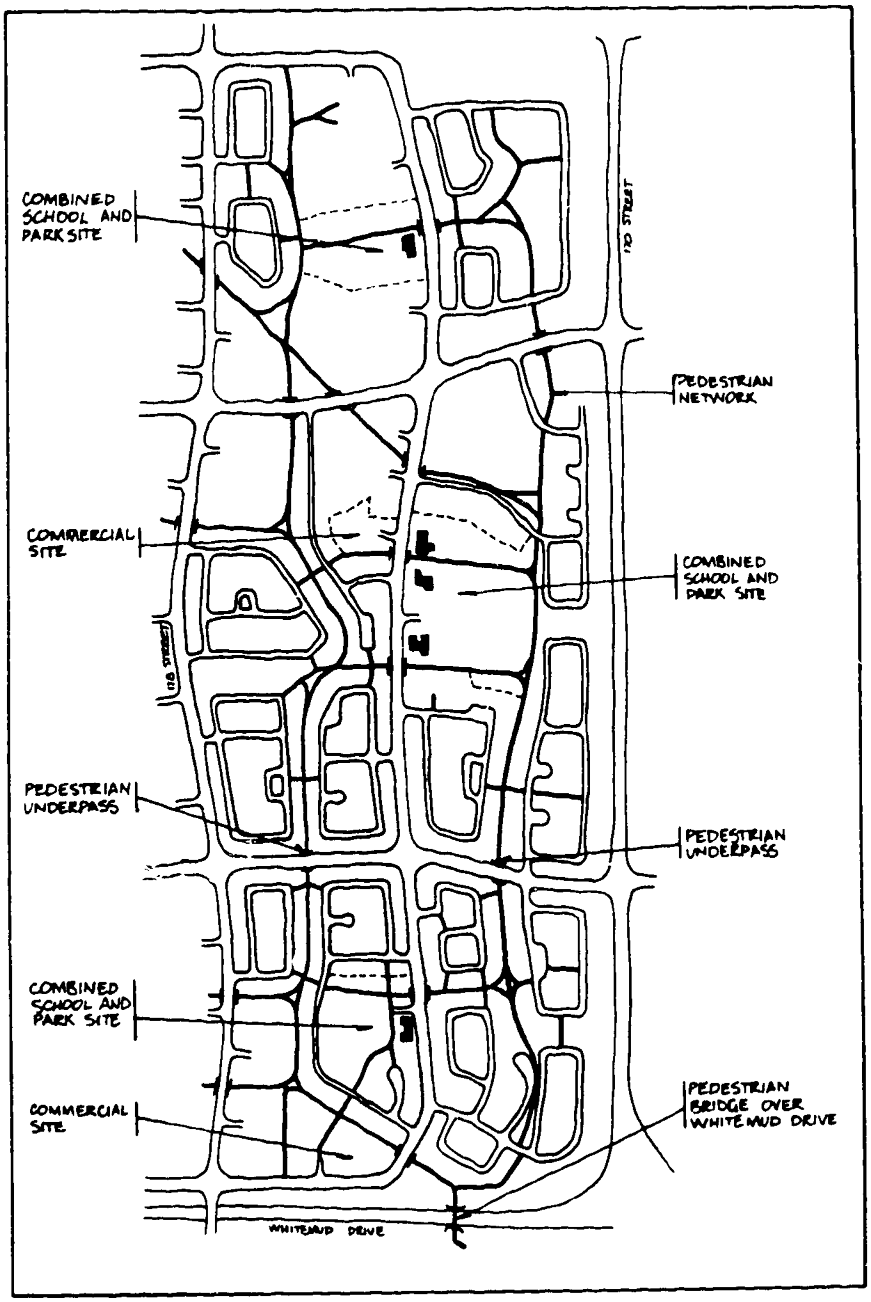


Figure 3.3
Typical views along the proposed pedestrian walkways, as envisaged in the West Jasper Place plan (Edmonton, 1967b:np)

The separation between pedestrians and vehicles in Jasper Place was proposed to be vertical as well as horizontal, with underpasses on the Radburn model (Figure 3.3), but neither aspect of separation was completely achieved. Horizontal separation occurred only in the first-built neighborhoods, such as Thorncliff and Aldergrove, when the separation theory was still being supported. Vertical separation was attained only once. At the time the observation research started (spring of 1988), there were no pedestrian underpasses anywhere in West Jasper Place, and only one overpass - over Whitemud Drive from Thorncliff to Callingwood North (Figure 3.2).

Following from their experience with the drafting of the West Jasper Place plan, City of Edmonton planners prepared a policy document, entitled Walkways in Residential Areas (Edmonton, 1968) - referred to from here on as the Walkways Policy. Its purpose was to provide public and private planners with general policies and guidelines for applying the new walkway concept to future residential development areas: a description of walkway functions, definitions of walkway types, their relationship to the road network, and examples of past walkway development. These guidelines also correspond directly with the walkway planning principles outlined in Section 2.3.5. For example, the Walkways Policy is based on the fundamental principle of separating pedestrian and vehicular traffic in the residential environment. The other principles are all addressed as well, either as general concepts or as more specific guidelines. The writers of this document were obviously influenced by walkway development theory and past practice, and drew on it to guide those planners who would implement the walkway concept in future residential areas in Edmonton.

In the following excerpts from the Walkways Policy, the corresponding walkway principles from Section 2.3.5 are numbered in parentheses after each paragraph:

> "The purpose of separating pedestrians and vehicles is to provide, on the one hand, a safe and direct system of pedestrian circulation and, on the other hand, a vehicular circulation system which is unhindered by people randomly crossing the road, or by the possibility of pedestrian-vehicle traffic accidents....This can be accomplished by substantial separation of vehicular and pedestrian traffic, especially of major walkways and major roads...." (1)

"The walkways should allow a pedestrian to traverse the full length of the neighbourhood, crossing only minor streets at grade....The walkways should link all housing groups to elementary schools, junior and senior high schools, thereby providing a safe and pleasant route for children going to school. The pedestrian system should provide the most direct access for people on foot to bus stops and key facilities, such as the neighborhood shopping centre, churches, parks, playgrounds and other social or recreational facilities.... [Pedestrian-vehicular] separation is effective only if the walkways are laid out to provide more direct access to pedestrian destinations than do the streets.... The usual pedestrian instinct is to take the shortest route...[so] the chief requirement for major walkways is that they follow a rational plan recognizing that most people in the course of their daily activities seek ways of avoiding extra steps and time...." (2,3,4)

"Walkways should be laid out to channel pedestrian traffic and force street crossings insofar as possible at safe, regulated points. Underpasses or overpasses may be desirable at heavy pedestrian crossings of major roads...." (5)

"The walkway system should be total in its extent...it should connect the neighbourhood to the surrounding neighbourhoods and to major commercial, recreational or educational centres. The emphasis should be on a system of continuous major walkways which are directly connected to housing groups and individual dwellings...." (6)

"The width of the walkways should allow for generous landscaping and the walkways should be integrated with the public open space.... The detailed alignment of walkways will also be determined by existing trees, hedgerows, creeks and ponds. Lines of existing trees should...coincide with pedestrian routes. Natural features such as small lakes, streams, rock outcrops, trees and shrubs should be preserved and incorporated into the final landscaping...." (7)

"The walkway system will also [e]ffect communication between people and thereby serves a social and recreational purpose. Walkways should help to create a better residential environment...by providing an opportunity for recreation and relaxation for residents of all age groups. Tot-lots, small playgrounds and sitting out areas should all form part of the walkway system.... Paved walks will also be used by children for roller skating and bicycling. These uses should not be overlooked in laying out the walkways" (8) (Edmonton, 1968:np).

From the evidence of the contemporary documents, it appears that the walkway planning guidelines had an immediate and substantial effect, an outcome enhanced by the fact that Edmonton was then entering a high-growth period. Large tracts of land were being prepared for residential development on an unprecedented scale, and whether the plans were prepared by the City of Edmonton's own planners or by private consultants, the influence of the Walkways Policy is evident in all of them. As a result, it was not altogether surprising to find, in the interviews, that public and private planners alike considered that their sectors had introduced the walkway concept to Edmonton. Although the Walkways Policy was written by city planners, planners from the private sector were involved from the outset with its application. For example, while the initial residential development plan for West Jasper Place was prepared by city planners, subsequent neighborhood plans in that community and almost all later residential development plans (except Riverbend-Terwillegar Heights and Mill Woods) were left to consultants. This was because of the sharp increase in residential development during the late 1960s and early 1970s, which made it necessary for city planners to concentrate on regulating the land development process to ensure that housing areas would be brought onto the market quickly and effectively. The City of Edmonton's role in residential walkway planning changed as well, from preparing plans to coordinating the review process and administering civic policies. In general, however, all the planners who were interviewed agreed that the walkway concept was introduced in the expectation that it would enhance the residential environment and increase safety for pedestrians.

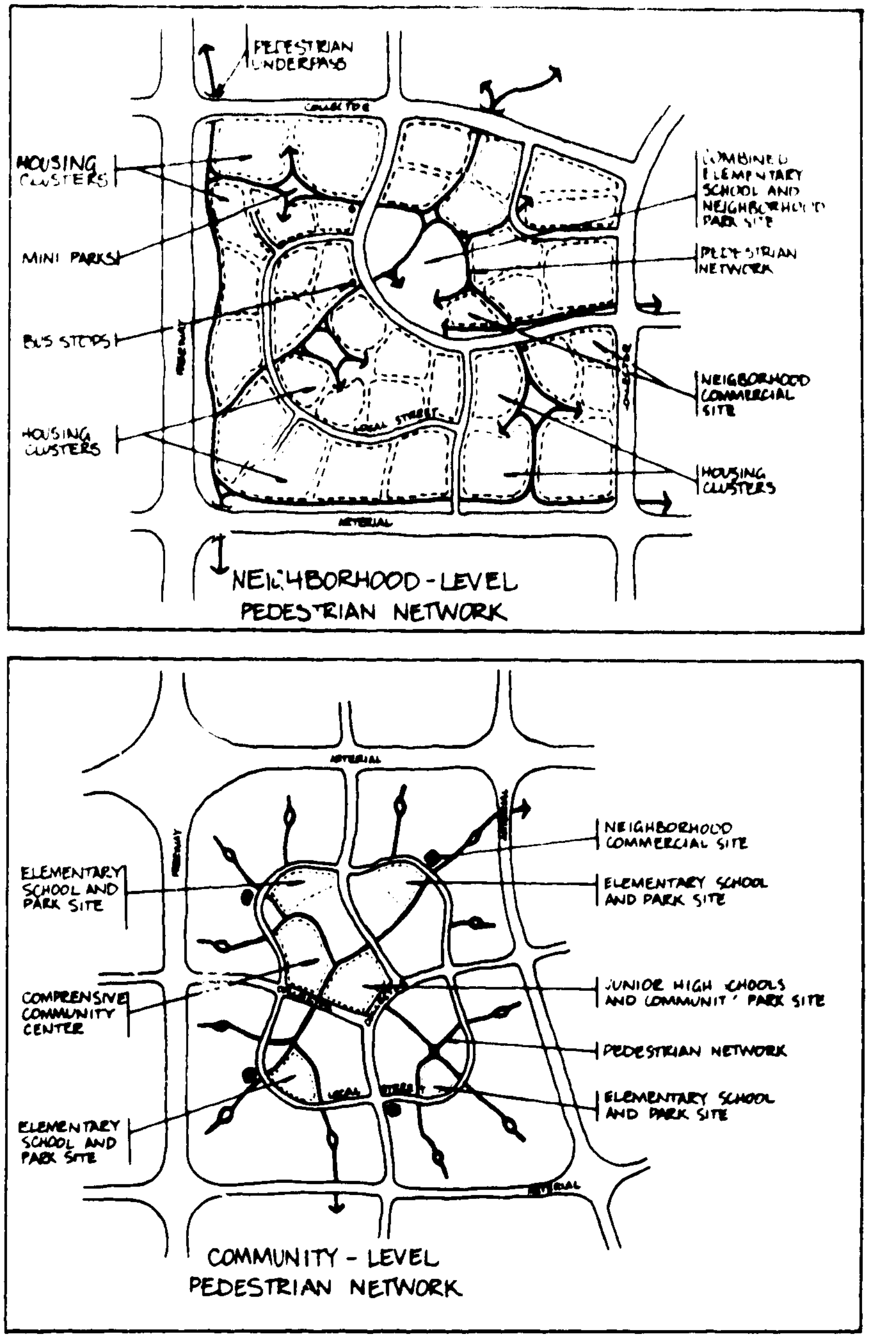
3.3.2 Application of the Separated Network Concept

An excellent illustration of the application of the walkway network concept at its most advanced level is provided by the plan for Mill Woods (1971). In this case, the City of Edmonton was both planner and developer, and so had more control over the application of the walkway concept than in West Jasper Place, where the planning of individual neighborhoods was taken over by private consultants. Walkway policy was also refined considerably between 1967, when it was first employed in the West Jasper Place plan, and 1970-71, when the Mill Woods plan was prepared. There, even more than in the West Jasper Place case, the needs of pedestrians were to be accommodated within a "continuous and imaginative open space system" on the Radburn model. In addition, in the words of the plan: "Pedestrian movement and bicycling will be facilitated by a system of trails, bikeways and walkways.... Golf courses, trails, picnic areas, bikeways will all form part of this recreational spine, linking parks, school sites and also connecting to the central core" (Edmonton, 1971b:np). To achieve these objectives, two design elements were considered crucial. First, to minimize conflict between pedestrians and vehicles, the two traffic types were to be physically separated throughout the residential development area. Second, to ensure the walkways formed a comprehensive system, the network was to be continuous at three levels of residential development - neighborhood, community, and town.

The main walkway planning principles for Mill Woods were illustrated through schematic diagrams of neighborhood and community structure (Figure 3.4). Thus, the walkways were to extend throughout each neighborhood, and from one neighborhood to another. Cluster development ideas were an important part of the plan as well; housing units were to be "...clustered around public transportation stops and small parks connected by walkways to major neighbourhood services such as schools and shops" (Edmonton, 1971b:np). Pedestrian traffic was to be channeled from these housing clusters to the combined elementary school and park sites, to neighborhood and community commercial sites, and past bus stops. Controlled crossings were to be used where walkways met collector roads, either in the form of overpasses or as marked pedestrian crosswalks. Although not shown on the diagrams, the plan proposed to integrate the open space system and walkway network with pipeline rights-of-way and other existing site features. There was no mention of recreational use of the walkways, though; their only stated purpose was to provide access to local service facilities, including recreational facilities.

This was also the general view that emerged from the interviews, that the function of the walkways, as they were originally conceived and built, was to provide access to local service facilities. Although the interviewed planners admitted that there was an implicit recreational purpose for the walkways, they did not regard it as a major component of any of the residential development plans or as something that was promoted by the City. The private planners, in particular, explained this by saying

Figure 3.4
Planned pedestrian circulation in Mill Woods
at the neighborhood and community levels
(adapted from Edmonton, 1971b:np)



that recreational activities were not as well accepted by either the general public or city officials as they are today. Going for a walk, for example, was acceptable, but providing special paths for walking would have been considered frivolous, while jogging was dismissed as 'freakish'. As a result, it was generally felt that admitting an explicit recreational purpose for the walkways would have made the concept more difficult to sell to developers and city officials alike.

3.3.3 The Change in Approach to Planning for Pedestrians

Subsequent events in both West Jasper Place and Mill Woods illustrate how planning for pedestrians changed as new neighborhoods came under development through the 1970s. In Mill Woods, for example, the first neighborhoods to be built, such as Tweddle Place and Richfield, have extensive pedestrian networks, often incorporating pipeline rights-of-way (Figure 3.5). These networks effectively join housing groups to schools, to neighborhood shopping areas, and to adjacent neighborhoods. As construction progressed in Mill Woods, however, support for the separation principle dwindled. Later neighborhoods, such as Weinlos and Pollard Meadows, have no networks, only short pedestrian linkages between traditional sidewalks (Figure 3.6). Similarly in West Jasper Place, the first neighborhoods, such as Aldergrove and Thorncliff, are the only ones that have extensive pedestrian networks (Figure 1.2). Walkways in later neighborhoods such as Callingwood South and Gariepy, while they are more extensive than the pedestrian linkages in Mill Woods, are nonetheless poor substitutes for the comprehensive networks built earlier (Figure 3.7).

Similar modifications can be observed in the other large residential areas that were started during the 1970s, including Riverbend/Terwillegar Heights, Clareview/Hermitage, Castle Downs, and Casselman-Steele Heights. The plans for all these areas maintained the use of pedestrian walkways in some form. None, however, proposed the fundamental principle that pedestrian and vehicular traffic should be fully separated. While the general purpose of the walkways was still to provide access from housing areas to neighborhood service facilities, no comprehensive networks were built to facilitate that purpose.

As early as the mid 1970s, then, there is evidence that the

Figure 3.5
Site plan of Tweddle Place and Richfield neighborhoods
Mill Woods, Edmonton
(adapted from Edmonton, 1971b)

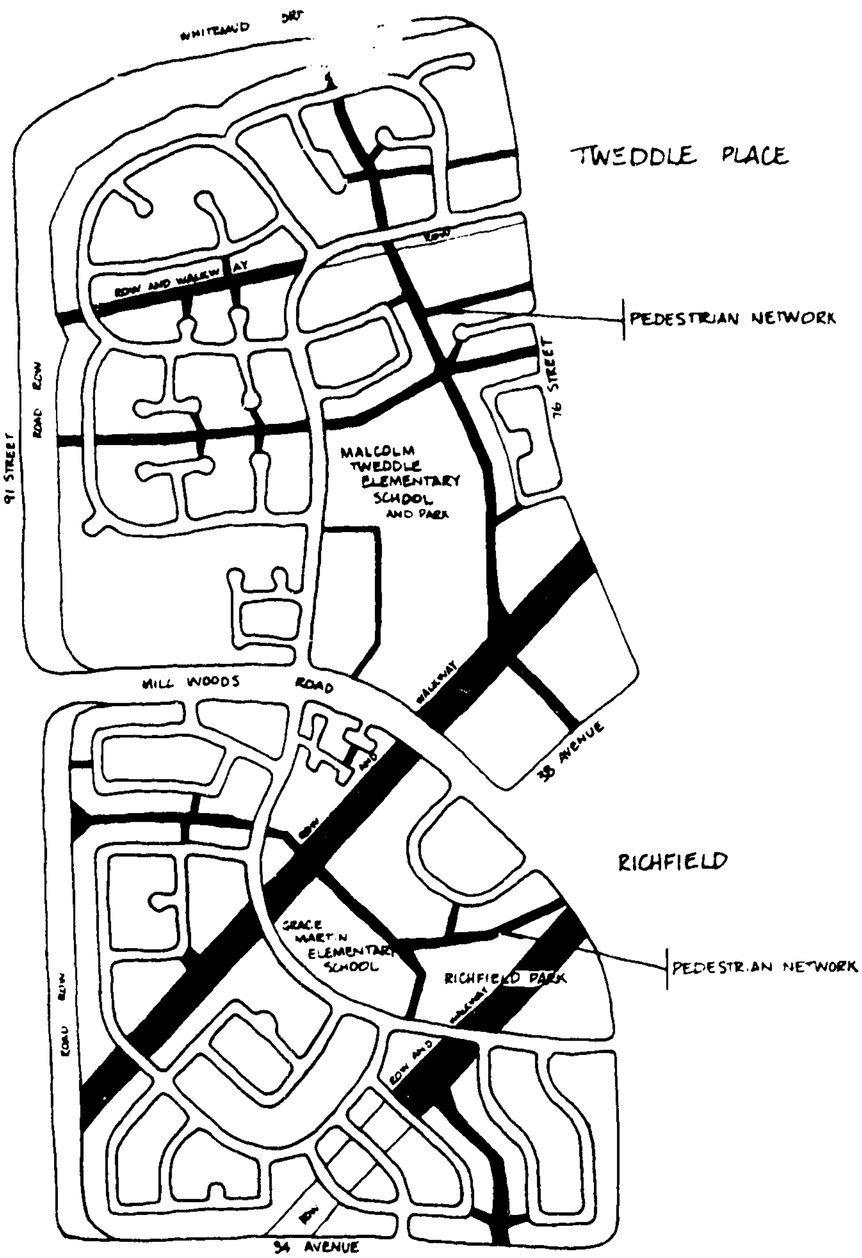


Figure 3.6
Site plan of Weinlos and Pollard Meadows neighborhoods
Mill Woods, Edmonton
(adapted from Edmonton, 1971b)

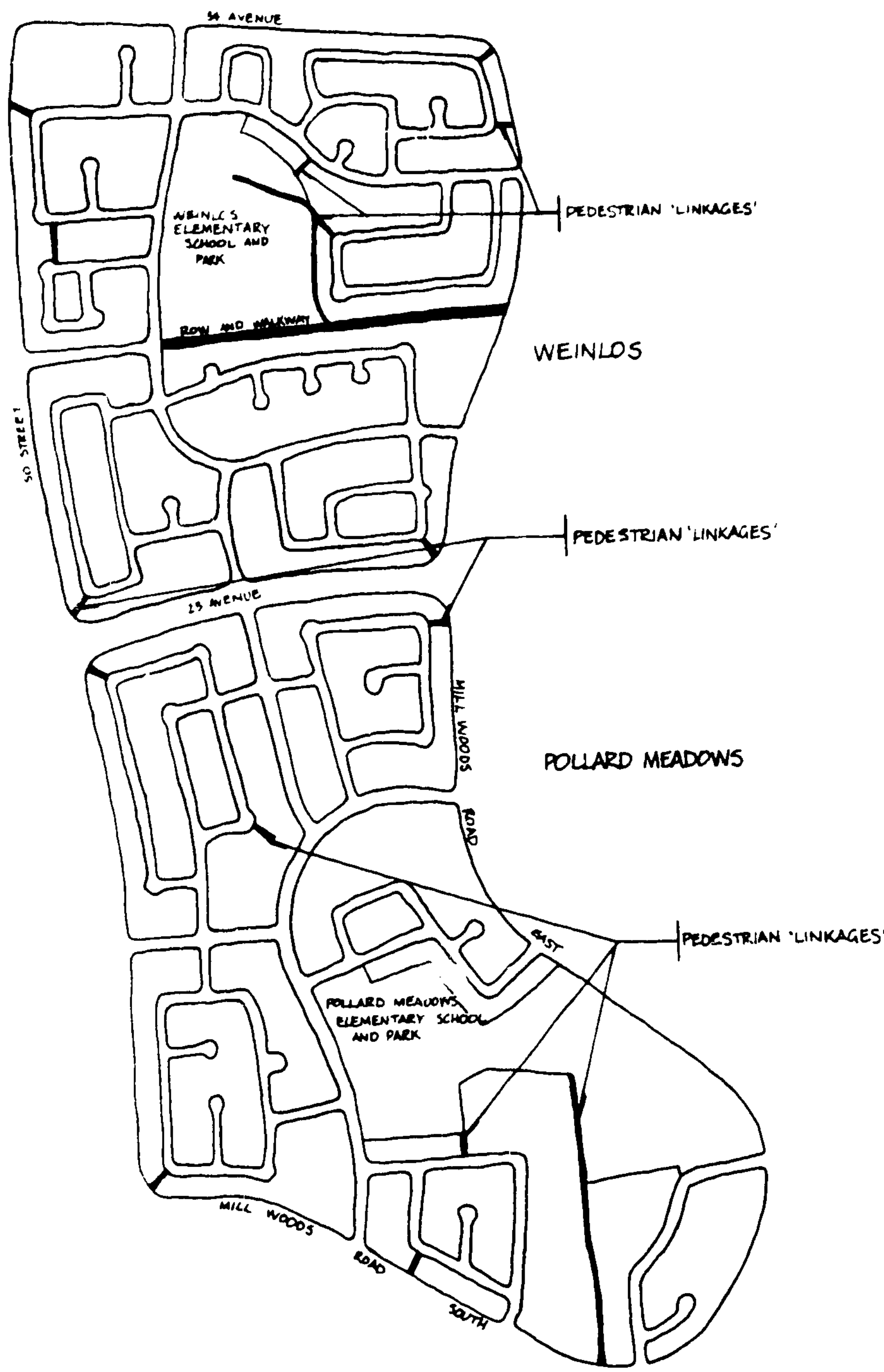
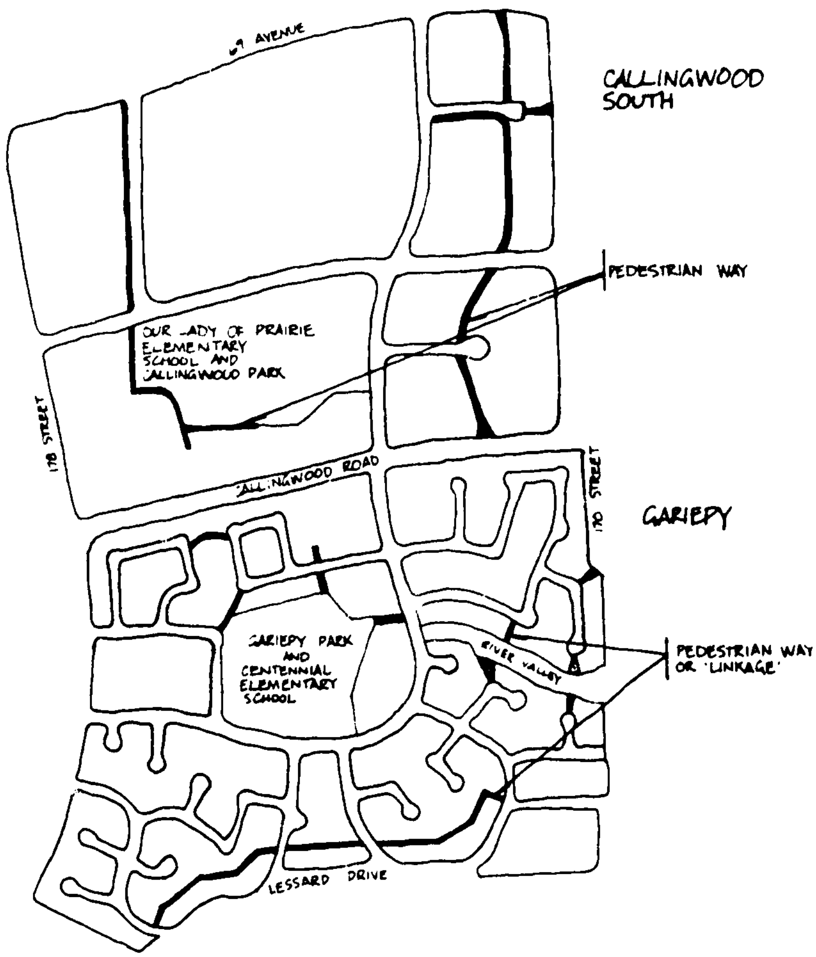


Figure 3.7
Site plan of Callingwood South and Gariepy neighborhoods
West Jasper Place, Edmonton
(adapted from Edmonton, 1967b)



separation principle was being phased out of residential development practice. In effect, pedestrian planning in Edmonton was reverting back to past ideas of accommodating pedestrians and vehicles within the same roadway right-of-way. Designs for new residential areas in the city since the late 1970s have re-established the use of sidewalks on the verges of roads, as implied by Figures 3.6 and 3.7.

3.3.4 The Change in Attitude to Planning for Pedestrians

Why did the approach to planning for pedestrians change in Edmonton? According to the planners who were interviewed, the change can be attributed to a combination of the following factors: a slowing economy, more demanding design standards and development requirements, unexpected and costly maintenance requirements, jurisdictional problems, and safety concerns. In combination, these factors brought about a change in attitude toward the walkway concept in all sectors of the community - public officials, private planners, developers, and citizens.

The first and most important factor was that Edmonton's economy slowed considerably from the mid to late 1970s, making growth in the residential development market difficult to sustain. In fact, this one factor had serious repercussions on all the others. Even before this occurred, however, early reaction to the walkway concept from developers was negative because they felt it required them to give up land which would be better used for building lots. Second, the introduction of comprehensive and elaborate networks prompted planners in various city departments to change the related design standards and development requirements to ensure that the walkway concept was being properly applied in new residential areas. Obviously, city officials felt these standards were necessary to develop a satisfactory residential environment, but developers argued that they were in excess of what was absolutely necessary. As the economy slowed, these requirements made it increasingly expensive and difficult for developers to bring new residential communities onto the market, thus increasing their already negative reaction to the walkways. On the other hand, the reaction of local residents to the new networks was basically unknown and largely unconsidered, typical of planning procedure at that time. It was not until the late 1970s, when the <u>Neighborhood Park Perception Study</u> was conducted, that any attempt was made to solicit public opinions about the walkways. Even then, the results were unhelpful. The study merely concluded that more research was required to determine how people felt about walkways in residential areas (Edmonton, 1982).

One particular development criterion that became a major point of contention between the city planning department and developers was the required reserve land dedication. During the late 1960s and early 1970s, the City required developers to surrender 40% of their gross land area before any subdivision plan would be approved. This was based on combining a 10% municipal reserve with the maximum of 30% that was permitted for circulation, as prescribed by the 1967 Alberta Planning Act and the associated Subdivision and Transfer Regulation. According to Mr. Driver, developers were often required to surrender even more than the 40%, sometimes up to 60% of their total developable area, even though the Planning Act stated that "...not more than 40 per cent of the gross area of the parcel being subdivided may be taken for public roadways and reserves without compensation to the owner" (Alberta Planning Act, 1967). The point of greatest significance here is that the two reserve allocations could be combined. If any municipal reserve land remained after parks, recreational areas and school sites were provided for, it could be used for circulation, and vice versa. Walkways were not specifically mentioned in the legislation, but, according to Mr. Mohr, roads in new neighborhoods typically require about 20 to 25% of the gross land area. Using an example of a 40% combined reserve dedication, then, if the full 10% municipal reserve was taken, and 20 to 25% was taken for roads, 5 to 10% could still be left for the walkways. If less than 10% of the municipal reserve was used, even more 'extra' land would have been available.

It was on this basis that civic officials so strongly supported the walkway concept; that is, that developers were expected to provide the land for walkways out of their reserve dedications. They were also required to pay all construction costs, on top of all the other development costs that they were responsible for. The slowing economy of the mid 1970s made it difficult for developers to meet these requirements, so they lobbied city council for changes to its development regulations. At the same time, the Planning Act and the Subdivision and Transfer Regulation were being revised, the most significant change for the present purpose being that the two reserve dedications could no longer be combined. The municipal reserve on its own could not exceed 10% of the total developable area, and the land taken for roadways and public utilities could not exceed 30%. Rightly or wrongly, the public planners who participated in the interview survey felt these new regulations had a negative effect on walkway development. Since compulsory land dedication was no longer feasible, walkways could be built only at public expense and city council was not prepared to do that.

In retrospect, it seems that there was a great deal of confusion among planners and city officials in interpreting the reserve land provisions of the planning legislation, confusion that was probably exacerbated by the fact that it was never clear whether walkways were a legitimate form of circulation under the Planning Act. Even with the changes to the Act, however, the walkway concept could have been sustained using other residential planning devices. At Radburn, for example, Stein and Wright's layout of the separate pedestrian networks was largely based on innovative design ideas - superblocks, a hierarchy of roads, an increased density of development, clustering, and slightly smaller single-family lots - not by requiring developers to forfeit land for them. In Edmonton's case, even accepting that the entire 30% circulation dedication would have been needed for roads, most of the pedestrian networks could have been provided simply by using the land normally given over for back-alleys, and then Stein and Wright's other measures would easily have provided the rest. Mr. Mackenzie and Mr. Driver both pointed out, however, that approval procedures that require developers to forfeit reserve dedications before development can begin makes it seem that they are sacrificing land that could be better used for houses and profit. Any benefits gained by designing a separate and comprehensive walkway network are therefore diminished because they are viewed as an 'add-on' feature rather than as an integral part of the overall neighborhood plan. The initial interest that developers showed in the walkway concept, as evidenced in the contemporary plans, seems to have waned quickly in the face of these practical objections.

Shortly after the first pedestrian networks were built, several new issues emerged: ui ɔected and costly maintenance requirements, jurisdictional problems, and safety concerns. These issues, too, were closely associated with Edmonton's slowing economy. As budget restrictions were being brought in, the comprehensive pedestrian networks were showing themselves to be expensive to maintain. Responsibilities were divided, as well. In general, hard surfaces (e.g. sidewalks) were maintained by the transportation department and soft surfaces (e.g. grass, trees, and furniture) by the parks and recreation department. As city departments re-evaluated their maintenance responsibilities to cut costs, the purpose of the walkways came into question (i.e. transportation versus recreation) to determine which city department should have to bear the responsibility for them. Added to the changes in the Planning Act, these cost-reducing measures resulted in changes to city policy, so that by the late 1970s the City would no longer approve a residential development plan if it included a comprehensive pedestrian network.

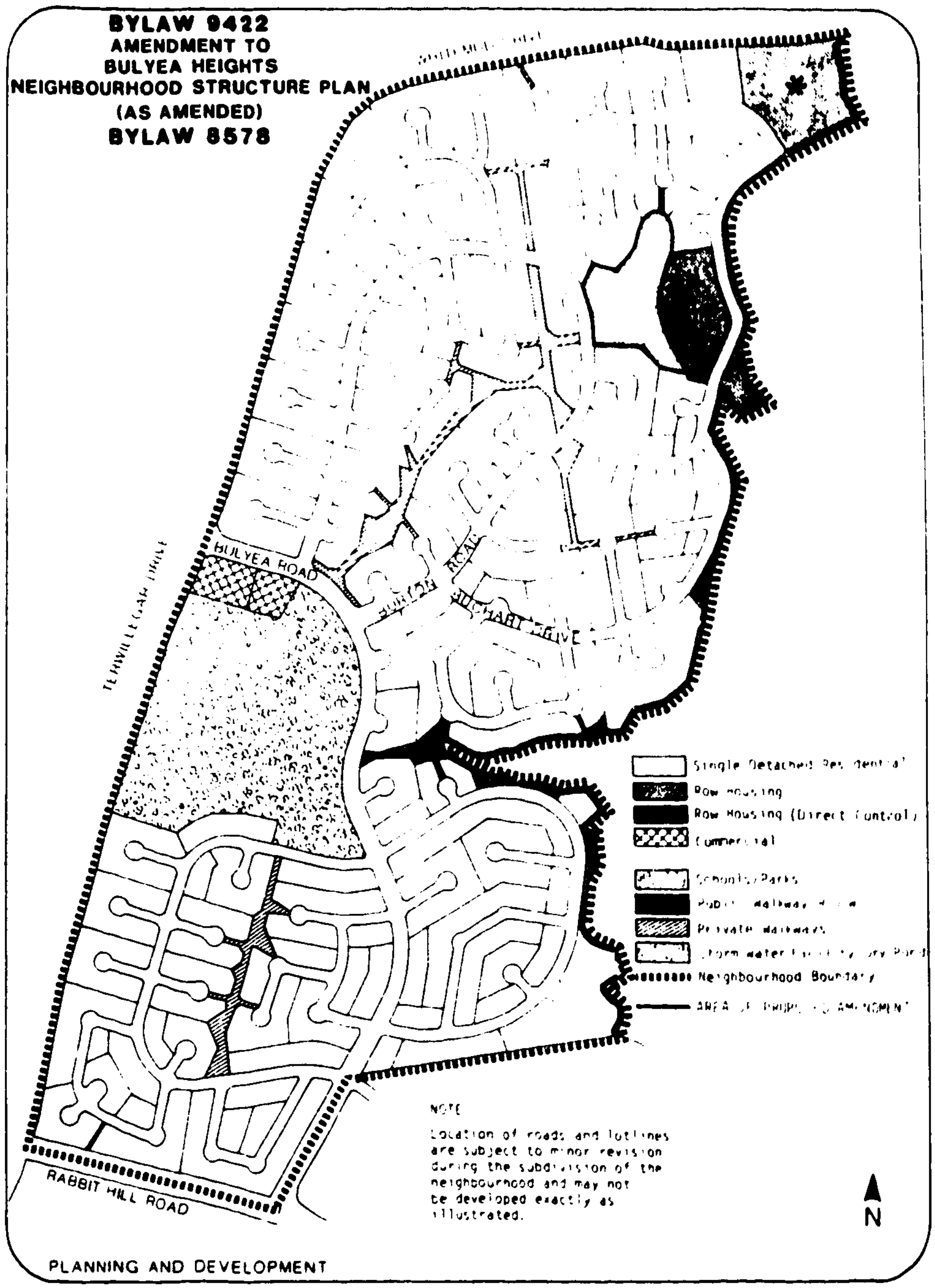
On top of these practical difficulties, there were also safety concerns, not the traditional planning concern about safety from vehicular traffic, but concerns arising from fears of personal attack. Since walkways are generally not well-lit at night, using them after dark was thought to be risky, particularly in winter. There was even concern about daytime use because most networks have some narrow or enclosed stretches, or areas where vegetation grows thick and close to the path. It was feared that someone being attacked in these areas would not be easily seen or heard. In the minds of many local residents and city officials, the walkway networks were entirely unsafe, day or night. Perceived or real, this was (and still is) an important issue of walkway use.

Since about 1980, as reported by the public planners in the interview survey, walkway development policy has been substantially modified. In place of comprehensive networks, the emphasis now is on more specialized facilities such as walkway linkages, spinal walkways on pipeline rights-of-way, and 'top-of-the-bank' walks along the river valley and its tributary ravines. Walkway linkages are typically built to provide access into a neighborhood or district park, or from a sidewalk within a cul-de-sac to one outside it, or to a bus stop, or from a stormwater lake to a park or school. Pipeline rights-of-way are considered suitable places to build spinal walkways because they cross many new residential development sites and are wide enough to accommodate both the public walkway and maintenance equipment (e.g. Mill Woods). Like the short linkages, spinal walkways are meant to provide access to local service facilities, though that is possible only if the services are located along a pipeline right-of-way. Similarly, the stated purpose of the top-of-the-bank walks is to provide recreational access to the valley system, although they are also intended to prevent residential encroachment along unstable valley walls and may well serve a recreational purpose in their own right.

All the interviewed planners agreed that the original walkway concept, as conceived in the late 1960s and early 1970s, could not be reintroduced in Edmonton. Public planners felt that in order for any kind of residential walkway network to be re-established, maintenance budgets would have to be increased, and a policy which stated their purpose and directed the roles and responsibilities of the concerned city departments would have to be adopted. Private planners felt it would not be possible to reintroduce the concept into cities the size of Edmonton because of the bureaucracy involved in the administrative process. All the interviewed planners agreed that the primary function of any new residential walkway would have to be to provide access to facilities, because access is still considered to be a more valid use than recreation. Despite these problems and concerns, however, none of the planners criticized the concept itself or said that walkways were a bad planning idea. They all seemed to believe that it was still a desirable concept, but could not reconcile that ideal with the practical obstacles.

Under certain circumstances, in fact, there is still life in the concept in Edmonton. In an attempt to attract high-income home-buyers, some developers have introduced a modified version of the separate walkway network in new residential areas. This is illustrated by the neighborhood structure plan for Bulyea Heights, part of the community of Terwillegar in southwestern Edmonton (Figure 3.8). The plan shows a private walkway extending through the center of the development area, surrounded by

Figure 3.8
New residential development in
Bulyea Heights neighborhood structure plan
(Edmonton, nd)



exclusive single-family detached homes on large lots. (There is also a public 'top-of-the-bank' walkway on the eastern edge of the site.) The primary difference between the internal walkway in Bulyea Heights and those in West Jasper Place is who has access to them. Walkways in West Jasper Place neighborhoods, such as Thorncliff, are unrestricted, and were intended to provide public access from one neighborhood to another throughout the development area. Conversely, the Bulyea Heights walkway is intended for the private and exclusive use of local residents, and so does not join with any other walkways outside the neighborhood. To maintain the privacy of the walkway, a development agreement was written up between the developer and the future residents of the neighborhood. The intention of the agreement (and the attraction for residents) is to build and sustain a high-quality residential environment, so the developer agreed to build and landscape the walkway and then maintain it for two years. By that time, it was expected that a neighborhood association would have been established and would have taken over its upkeep.

3.4 IMPLICATIONS FOR THE RESEARCH PLAN

The evidence that emerged from the interviews pointed to one overriding conclusion: the concept of comprehensive networks of separated walkways fell into disfavor in Edmonton because it came to be seen as impractical. By and large, however, the reasons were administrative and financial; they did not derive from a more fundamental concern about the functional value of walkway networks in relation to the general goal of enhancing the residential environment for pedestrians. There was no indication, from either the interview survey or the documentary sources, that planning policy changed because the developed walkways had proved to be ineffective or were failing to live up to the planners' original expectations. But does that necessarily mean that the existing walkways do indeed serve a useful purpose, or that they are well used by local residents? In the absence of systematic surveys of actual use patterns, these basic questions remain unanswered. The case study of Thorncliff and Aldergrove was designed to try to answer them, using the technique of direct observation.

An important methodological question then followed: by what criteria should the observed use patterns be judged if the effectiveness of the walkway networks in Thorncliff and Aldergrove was to be evaluated? The obvious standard procedure was to adopt a goal-attainment approach (Carley, 1987) and base the evaluations on the planners' intended outcomes. That is, to determine, by quantitative measures if at all possible, how well the planning objectives had been achieved.

From the review of the contemporary documents that has been presented in this chapter, two general sets of objectives stand out. First, as described in the West Jasper Place plan, the networks in Thorncliff and Aldergrove were particularly intended for the use of a special group of people, defined by the fact that they did not own or drive a car. These people were preschool and school-age children, the elderly, and housewives of one-car families, all of whom were expected to need to walk regularly between their homes and various service destinations. This also implied that walking was expected to be the dominant activity on the walkways, although the possibility of some recreational activity was recognized, if only in passing. It was therefore important to design the observation survey so as to be able to differentiate the age, sex, and activity characteristics of the walkway users. In addition, the fact that the plan singled out these particular kinds of users carried the implication that they would need to use the walkways more at some times than at others - when schools were in session, for example. Admittedly, the policy documents were vague on this point; indeed, none of the objectives was framed so as to provide a definite standard for measuring the plan's performance, as modern theory requires. By combining temporal indicators with the age, sex, and activity characteristics, however, it was hoped to be able to compile a reasonably complete picture of when and how the walkways in Thorncliff and Aldergrove were used and by whom, a picture that could then be compared with the rather vague planning intentions.

The second set of planning objectives addresses the spatial organization or layout of the walkway networks, with particular reference to their intended purpose of providing convenient access to local service facilities. As described in Chapter 2, this has always been regarded as the principal justification for walkway networks, and its importance in the Edmonton context came out strongly in all the planning documents that were reviewed, as well as from the interviews with practising planners. The practical implication, which was particularly emphasized in the West Jasper Place plan, is that walkways should link homes with service facilities by the most direct routes possible. To test the effectiveness of actual walkways on that criterion, it was necessary to be able to measure the intensity of use on all section of the two networks, and to analyze the flow patterns of pedestrians in relation to the main service destinations. The observation survey had therefore to be designed to provide systematic coverage of the entire walkway networks.

As a close corollary to the objectives of convenience and directness, planners have long believed that walkways should be laid out to be as safe as possible from traffic hazards. The safety of children walking to and from school has always been the principal concern, and that too was strongly reflected in Edmonton's policy documents. Indeed, as far as the West Jasper Place plan was concerned, the convenience and safety of school children was the single most important issue that the walkways were meant to resolve. It therefore warranted special attention in the research plan, in the form of a separate survey of the routes that children take to school.

CHAPTF' 4

OBSERVED WALKWAY USE:
TEMPORAL USER, AND ACTIVITY PATTERNS

4.1 INTRODUCTION

This chapter addresses the second research objective, namely, to assess the levels of use on the Thorncliff and Aldergrove networks, and to compare actual use patterns with the original policy objectives. The record of actual use was compiled using the observation method of data collection. This provided a systematic and extensive record of use, which enabled comparisons to be made with the policy objectives set by the Walkways Policy and the West Jasper Place plan.

The first section of the chapter reviews the methodological components of the research. A literature review describes the theory upon which the observation method of data collection is based. Next, the data collection method used to record the observations in the study area during the research period is outlined, and then the analytical methods are explained. The second section presents the results of the walkway use analyses. It is divided into three areas: 1) temporal patterns of use, 2) walkway users, and 3) walkway activities. The final section provides an interpretation of the results by outlining several scenarios of use based on the analyzed temporal, user, and activity patterns. Then possible reasons for these use patterns are discussed, particularly in terms of how the levels and kinds of use patterns compare with the policy objectives from the West Jasper Place plan.

4.2 RESEARCH METHODS

4.2.1 Theory of Observation Research

The observation method of social science research has been defined as "...the purposeful and selective watching and counting of phenomena as they take place" (Burton and Cherry, 1970:126). This method requires the actual observations to be systematic, first, so the data are collected in an efficient, organized and consistent manner, and second, to make them easy to manipulate and analyze. The techniques of observation must also be suited to the research problem or risk being a waste of time and effort for both researcher and subject. Most importantly, they must be reliable and objective. The recorded data must accurately represent the source from which they are taken, and should not be unduly influenced by the observer collecting them (Burton and Cherry, 1970; Moser and Kalton, 1971).

In theory, there is a spectrum of roles that an observer can play, ranging from 'complete participant' at one extreme to 'complete observer' at the other (Table 4.1). In the former case the observer is actively involved with the people being observed, but his true identity and purpose are not revealed to them. He behaves in accordance with their behaviors

Table 4.1
Potential roles an observer can assume

'going native'<------------increase----------------------

complete participant	observer as participant	participant as observer	complete observer

-------------------increase----------->'misunderstanding'

ACTIVE INVOLVEMENT <——————————> PASSIVE INVOLVEMENT

(adapted from Schwartz and Schwartz, 1954:348-350; and Gold, 1958: 219-222)

and experiences life as they do. The data are collected covertly, but the closeness between the subject and the observer increases both the amount of data that can be collected and the understanding of their situation. Such active involvement, however, also increases the potential that the researcher may begin to identify himself with his created role ('going native'). In such an event, it becomes increasingly difficult for him to differentiate between his role as researcher and his created role, and hence to remain objective in his interpretations of his observations.

At the other end of the scale, the complete observer is only passively involved with the subjects. He records their behaviors with little or no interaction so as not to influence their actions. Although his purposes may be known to some or all of them, the observer attempts to remain unobtrusive. Such emotional detachment results in a more accurate and objective record of the subjects' behaviors, but it may also increase the potential for the researcher to 'misunderstand' the observed behaviors and so lead him to false conclusions.

The two intermediate roles, participant-as-observer and observer-as-participant, both involve some degree of participation by the researcher in the activity or behavior being studied. The researcher may interact with the subjects directly or observe from a short distance away, but in all instances the subjects are aware of his presence and know that their behaviors are being observed. It is generally agreed that the problems with going native or misunderstanding are reduced because the researcher is close enough to the subjects to understand the observed behavior, but still detached enough to maintain some degree of objectivity (Gold, 1958).

4.2.2 Survey Method

For thesis purposes I decided that the 'complete observer' role was the most appropriate one because I wanted the data record to be as objective as possible, which meant that the observers should do nothing that might influence the walkway users' behaviors. Obviously, no observer can be completely inconspicuous all the time, but every effort was made to remain unobtrusive. The research project was not publicized in any way and explanations were offered only when someone specifically asked one of us what we were doing. The intention then was to ensure that users of the walkways did not become alarmed by the presence of strangers, and so alter their behavior.

To reduce the possibility of misunderstanding or misinterpretation of the observed walkway use, data were collected over an extended period, from mid-July 1988 to the end of January 1989. Even before this, a series of preliminary field surveys and pretests was conducted throughout May, June, and early July of 1988 to ensure the collected data would be reliable. During the full period, from May to January, over 200 hours were spent observing and recording the activities of over 3000 people. Two observers were involved with the data collection process, but I did the greatest portion of it.

The observation data were collected along three temporal indicators: time of year, time of week, and time of day. Walkway use by time of year was broken down into summer, fall, and winter. Summer observations were collected during July and August, concluding before school started in early September. Fall observations were collected during September and October, and concluded with the first snowfall in early November. Winter observations then continued through November and December to the end of January. The original intention was to observe walkway behavior over all four seasons, but I had a baby in February 1989, which eliminated the possibility of spring observations. As it turned out, the data from the three seasons were more than sufficient for the analyses.

Throughout these seasons, the survey data were collected for three dayti· periods (morning, afternoon, and evening), on all days of the week, and during both weekend days. The morning observations were conducted between 9:00 am and 12:00 noon, the afternoon ones between 1:00 pm and 4:00 pm, and the evening ones between 6:00 pm and 9:00 pm. These same three periods were used for both weekday and weekend observations. Each of the periods was originally set up to be a three-hour block, but the evening observation schedule was adjusted to start after 6:30 pm; preliminary field surveys had shown that people were not on the walkways before then. They also revealed that very few people used the walkways after dark, about 9:00 pm in late summer.

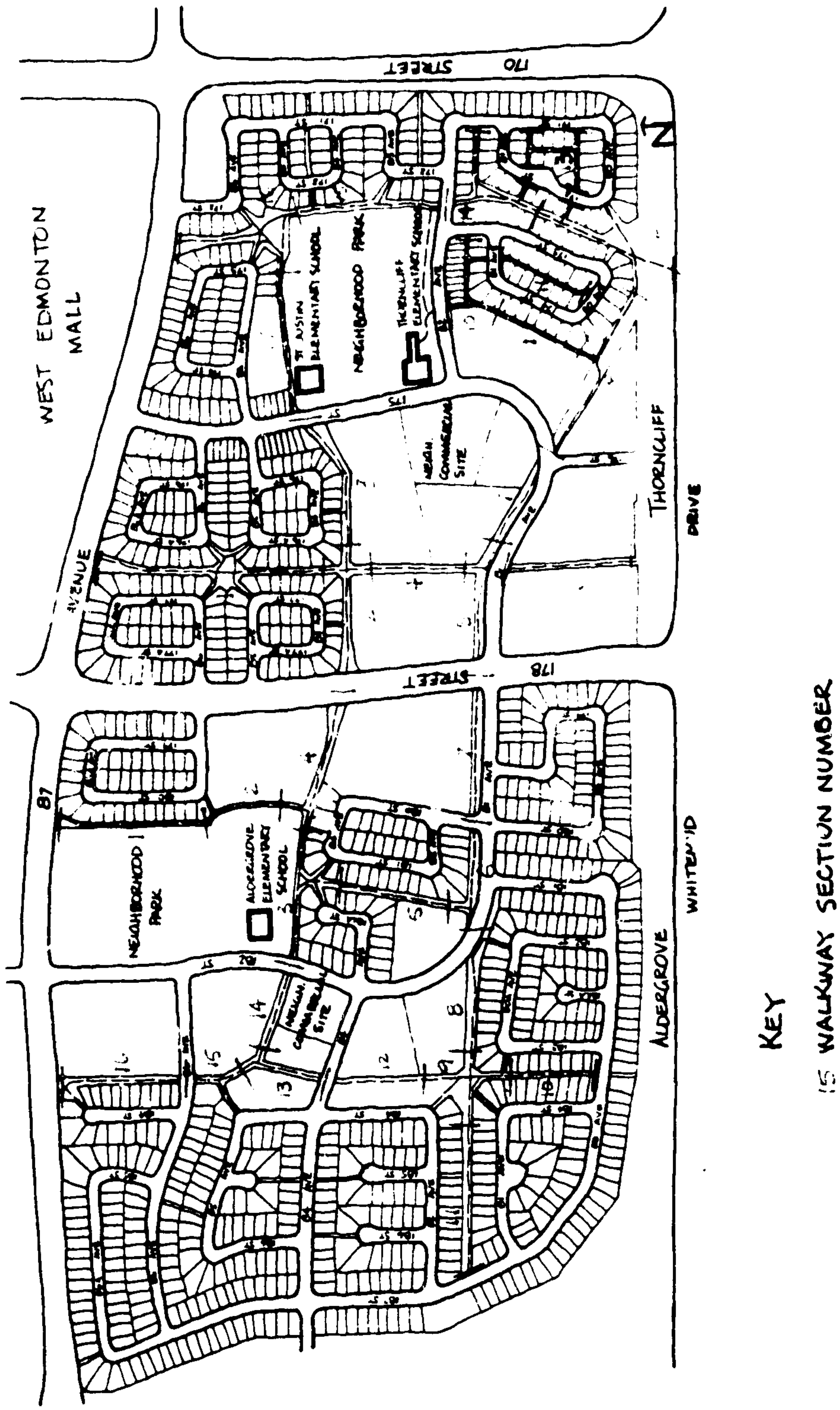
The time-frames for morning and afternoon data collection were deliberately set to avoid recording school children on the walkways during peak-use periods. The preliminary field surveys had shown that three periods were critical in terms of time: 1) before school started (between 8:00 am and 9:00 am); 2) over the school lunch hour (between 12:00 noon and 1:00 pm); and 3) after school was finished (between 3:30 pm and 4:00 pm). It also emerged that school children were the primary users during these peak periods and that high rates of use were occurring simultaneously in all neighborhood sections. Being able to analyze use by school children was vital to the research plan, but with so many children on the walkways at the same time, their behavior could not be adequately recorded by two observers, let alone one. An alternative research method was therefore devised; this was the mapping survey, the subject of Chapter 6.

To facilitate the recording process, Aldergrove and Thorncliff were divided into sixteen and seventeen sections respectively (Figure 4.1). During pretests, I tried recording walkway use for one of the daily time-periods as I walked through one of the neighborhoods, but this proved unworkable. In order to obtain an accurate representation of walkway use for that time-period, I would have had to be able to see throughout the entire neighborhood at one time or risk missing walkway use in one area while recording it in another. Subdividing each neighborhood into sections allowed me to compile a systematic record of walkway use throughout the neighborhood over each time-period. A composite picture could then be obtained by combining the records of use in all the neighborhood sections for that period.

The size of each section was based on my ability to see the whole of it, and particularly all entrances and exits, while remaining in one place. Pretests of different section sizes had shown that if I had to move from one end of a large section to another, I would probably miss people on the walkways. By reducing the sizes of sections and remaining stationary, I would not miss anyone. Section size and observer location were also important because walkway use in each section was recorded for only fifteen minutes, and the observers had to be able to make the most of their time in any one section.

The fifteen-minute observation interval was chosen for two reasons. First, pretesting had shown that this time interval produced a reasonably accurate representation of walkway use in the neighborhood sections for each of the daily time-periods. If, for example, the observation interval in the section was increased to one-half hour or one hour, the number of walkway users also increased proportionately. Second, there was a time consideration. Even with this seemingly short observation interval, a complete circuit of one neighborhood required four hours and fifteen minutes in Thorncliff and four hours in Aldergrove. Since the observation periods were three hours long at most, each study neighborhood had to be divided in half. Using a fifteen-minute data collection interval, it still took two to two-and-a-half hours to complete the survey in half a neighborhood, but the process could now be accommodated within the three-hour time-periods. Doing this for three time-periods in a day meant spending at least six hours in the study area per day. The fifteen-minute

Figure 4.1
Neighborhood walkway sections



observation intervals were therefore considered to be long enough to maintain accuracy, yet short enough to collect the data reasonably quickly.

A field observation schedule (Figure 4.2) was deve'oped to make the data recording process systematic, practical, and accurate. It was based on using a controlled observation procedure, designed to address several important factors. First, the study period was very long and the two study neighborhoods were quite large. Recording accuracy had to be maintained over the enti e seven months, so as to provide a consistent record of the daily, weekly, and seasonal variations in use. Second, the data were collected by two observers, so it was crucial that both would record them in exactly the same way. Third, it was ofte essary to record more than one group of people at a time in e walkway sec on under observation. The field schedule was designed s is o l be done easily and without confusion.

The lis way activities on the schedule was adapted partly from the prop s outlined by the West Jasper Place plan, and partly from prelimi d surveys and pretests in Aldergrove and Thorncliff. The specific ag x categories for the schedule were also based on these surveys and pretests. Then the schedule was adjusted to accommodate seasonal uses, and an 'other' category was added to record any activities or uses that had been overlooked. Places to record the weather, the season, the date, the time that observations started and finished, the neighborhood being obse , and the specific section being observed within that neighborhood were also included on the schedule. Weather had an important effect on walkway use and observation procedures. For example, observations were not made when the temperature fell below minus 15 degrees Celsius. Although the winter of 1988/89 was a fairly mild one, that temperature was as cold as the observers could endure while sitting outside for two hours, even with hand warmers. In addition, pretesting had shown that people did not use the walkways when it rained, so data were collected only during intermittent light rain, or if the rain started halfway through an observation session.

The schedule required the observers to take note of walkway tivities as a function of the age and sex of people using the

Figure 4.2
A sample field observation schedule

FIELD OBSERVATION SCHEDULE

NEIGHBORHOOD WALKWAYS

Neighborhood: A or T (Aldergrove or Thorncliff)

Section: (Section # in neighborhood)

Weather: (Temperature from radio at start and finish, also cloudcover, precipitation, and wind)

Date:

Time: (Exact starting time to nearest 5 minutes)

Summer/Fall Observations (Circle one)

AGE/SEX OF PEOPLE OBSERVED

WALKWAY ACTIVITIES	Child (0-12)		Teen (13-19)		Adult (20-60)		Senior (60+)	
	M	F	M	F	M	F	M	F
walk		A2			A1 B1			C2
run/jog								
bicycle	C1 D4	C1						
skateboard								
wheelchair								
roller-skates/skis								
baby stroller	E1				E1	E1		
walk dog								
other								

COMMENTS:

walkways (Figure 4.2). Observations were recorded using an alphanumeric code, which identified the numbers of groups of walkway users in each neighborhood section, the numbers of people in each group, and the activities in which they were engaged. Thus, the first group of people observed in a particular section was designated by the first letter of the alphabet - 'A'. For ease of recording, both individuals and parties of users were considered to be groups. Each subsequent group was given the next alphabet designation, and so on, until the observation time for that section was over. The age/sex category and activity of each person in each group was recorded as well. Figure 4.2 and the following five examples illustrate the procedure:

Group 'A' has 3 people: all 3 are walking; 2 are girls under the age of 12, and 1 is an adult male. The schedule shows 'A2' where 'Child F' ('F' = Female) and 'walk' intersect on the schedule, and 'A1' where 'Adult M' ('M' = Male) and 'walk' intersect.

Group 'B' has 1 person: 1 adult male, walking. The schedule shows 'B1' where 'Adult M' and 'walk' intersect.

Group 'C' has 4 people: 2 are children riding bicycles, 1 boy and 1 girl; the other 2 are elderly women, walking with the children. The schedule shows 'C1' where 'Child M' and 'bicycle' intersect, 'C1' where 'Child F' and 'bicycle' intersect, and 'C2' where 'Senior F' and 'walk' intersect.

Group 'D' also has 4 people: all 4 are boys under the age of 12; all of them are riding bicycles. The schedule shows 'D4' where 'Child M' and 'bicycle' intersect.

Group 'E' has 3 people: 1 is a baby boy in a stroller; the other two are adults, a man and a woman, who are pushing the stroller. The schedule shows 'E1' where 'Child M' and 'baby stroller' intersect, 'E1' where 'Adult M' and 'baby stroller' intersect, and 'E1' where 'Adult F' and 'baby stroller' intersect. For the data record, it did not matter which adult was actually pushing the stroller; it was more important that all three people were recorded as using the walkway for this activity.

In addition to the observation schedule, a sketch plan of each neighborhood section was used to show where each group entered and exited the particular walkway section under observation. At the time the data were being collected, I was interested in recording exactly where users entered and exited the walkway sections and their actual paths while in that section. In the end, however, this material was not included in the thesis because it proved to be difficult to collect the information accurately, and even more difficult to devise a way to analyze it.

There were a few problems associated with the data collection procedure, primarily related to specific situations that arose while in the field. Foremost among them was the difficulty of remaining unobtrusive. Several sections of the walkway networks are fairly narrow, and any person using them could not help but notice an observer, with note pad and pencil, writing things down. Normally, the standard explanation quieted any concern, but at least once the police were called. The situation was dealt with by showing the policeman the observation recording sheet and explaining the research project to him.

The second more serious problem occurred while collecting fall and winter walkway use data. The colder weather prompted people using the walkways to wear heavy clothing, making it much more challenging to determine the age and sex of walkway users, particularly infants. The colder weather, particularly in December and January, also affected the amount of data that could be collected because it was difficult for the observers to keep warm while sitting outside for two hours.

The original intention, in terms of data collection, was to obtain two sets of observations for each study neighborhood for each temporal indicator - time of day (morning, afternoon, evening), time of week (weekdays, weekends), and time of year (summer, fall, winter). A complete circuit of all the walkway sections in both neighborhoods during one time of the day made up one observation set. But while it was possible to collect two sets for all times of day during weekdays in summer and fall (Table 4.2), only one data set was collected for weekday mornings and afternoons in winter because of the difficulties created by cold weather. In terms of weekend data, no more than one set could be collected in any time period. With only Saturdays and Sundays to work with, there was

Table 4.2
Observation sets completed in the study area

Sets	Morning	Afternoon	Evening	Total
Summer Weekday	2	2	2	6
Summer Weekend	1	1	1	3
Fall Weekday	2	2	2	6
Fall Weekend	1	1	1	3
Winter Weekday	1	1	0	2
Winter Weekend	1	1	0	2
Total	8	8	6	22

insufficient time to collect a complete second set in any time-period for any season. Colder weather, shorter daylight hours, and poor lighting further affected evening data collection in the fall and winter, especially on weekends. Not only was the identification process made more difficult, the deserted walkways felt like a dangerous place for a lone person to be sitting in the near-dark. Even so, one set of data was collected for weekend evening use in the fall. Evening data collection in winter proved to be impractical, however, for either weekdays or weekends. We set out to record winter evening use on several occasions, but so few people were observed that it was not worth the effort. In sum, then, 22 sets of observations were completed, rather than the 36 that had originally been planned.

4.2.3 Analytical Method

To facilitate the analyses, the data were separated into three aspects: 1) temporal patterns of use, 2) characteristics of walkway users, and 3) walkway activities.

The data are presented in the form of crosstabulations based on total use; related tables showing use for each neighborhood separately are in Appendix 2. Since the use patterns in each neighborhood were generally the same as for total use, removing the neighborhood data to the appendix simplified the analytical procedure and the discussion of results. The analyses for the observation data are based primarily on descriptive statistics. Both absolute frequencies (n) and proportions (%) are presented in the crosstabulations because each provides its own distinctive information and insights about the various patterns of walkway use.

The procedure for this analysis involves, first, discussing the main findings that stand out from the tables, and second, attempting to suggest what these findings might indicate and what they mean for the research. Chi square statistical tests of significance were conducted on the frequency data in all the tables to determine if there was a statistically significant difference in the use patterns between or among variables. The procedure for this test is described in Ebdon (1985). The null hypothesis (Ho) was always that there was no difference between the variables. The alternative hypothesis (H1) was that there was a difference at a 0.05 level of significance. This meant that the relationship between the variables would be considered accurate nineteen times out of twenty, or ninety-five percent of the time; a higher level of significance is not usually thought to be necessary for this kind of research (Ebdon, 1985).

Since unequal numbers of data sets were collected over the survey period (see Table 4.2), a weighting procedure was adopted to compensate for the imbalances. This procedure was applied in three situations. First, time of week use was adjusted to ref[illegible] fact that fifteen sets of weekday observations were collected, as [illegible]ared with nine for weekends. (Winter evenings are included in this calculation since the zero observations in effect represented zero use.) By multiplying weekday use by three-fifths, the adjusted values permitted a more accurate comparison of weekday and weekend patterns. These adjustments were applied to Tables 4.5, 4.17, 4.18, and 4.25. Second, seasonal use was adjusted to reflect the fact that nine sets of observations were collected in each of summer and fall, whereas only six were collected for winter. Summer and fall use was therefore multiplied by two-thirds; these adjustments were applied to Tables 4.3, 4.8 and 4.24. Third, the frequency values for time of week by time of year use were adjusted to reflect the fact that six sets of observations were collected for weekdays in each of summer and fall, as compared with only three sets for all other times. Summer and fall weekday use was multiplied by one-half in Table 4.4, the only table that was affected by this adjustment. Tables showing the unadjusted frequencies of use can be found in Appendix 2 for the six basic use variables: time of day, time of week, season, age-group, sex, and activity.

As a final note, readers are reminded that the analyses here exclude some of the heaviest use made of the walkways - that by children going to and from school. This aspect of use is examined in Chapter 6.

4.3 TEMPORAL PATTERNS OF USE

In total, 3311 people were observed on the walkways over the full study period. The observations were by no means uniformly distributed, however, but varied among the three daily time-periods and the three seasons covered by the survey, as well as between weekdays and weekends. In every case, the differences in distributions were statistically significant.

The analyses of the temporal patterns of use are derived from three crosstabulations: time of day by season (Table 4.3), time of week by season (Table 4.4), and time of day by time of week (Table 4.5). These tables are analyzed as a group to avoid repeating overlapping results.

Four main points are apparent from the tables. First, there were pronounced seasonal variations to the use patterns; 53% of total use occurred in the summer period, as compared with 36% in the fall and only 11% in winter. Second, evenings were the most favored time of day for people to use the walkways (44% of total use), in spite of the fact that there was no evening use in winter. Summer evenings were especially

Table 4.3
Time of day by season

Time of Day	Summer n*	(%)	Fall n*	(%)	Winter n	(%)	Total n*	(%)
Morning	233	(10)	179	(8)	111	(5)	523	(23)
Afternoon	391	(17)	228	(10)	145	(6)	764	(33)
Evening	596	(26)	410	(18)	0	(0)	1006	(44)
Total	1220	(53)	817	(36)	256	(11)	2293	(100)

Chi square = 231.24; d.f. = 4; $p < 0.05$

n* = adjusted frequencies

Table 4.4
Time of week by season

Time of Week	Summer n	(%)	Fall n	(%)	Winter n	(%)	Total n	(%)
Weekday	662*	(29)	404*	(18)	105	(5)	1171*	(52)
Weekend	505	(22)	421	(19)	151	(7)	1077	(4[illegible]
Total	1167*	(51)	825*	(37)	256	(12)	2248*	([illegible]
Chi square = 28.29; d.f. = 2; $p < 0.05$								

* adjusted frequencies

Table 4.5
Time of day by time of week

Time of Day	Weekday n*	(%)	Weekend n	(%)	Total n*	(%)
Morning	297	(12)	249	(11)	546	(23)
Afternoon	394	(16)	418	(17)	812	(33)
Evening	646	(27)	416	(17)	1062	(44)
Total	1337	(55)	1083	(45)	2420	(100)
Chi square = 28.40; d.f. = 2; $p < 0.05$						

n* = adjusted frequencies

popular, accounting for more than a quarter of all walkway use. Fall evenings and summer afternoons attracted fairly heavy use as well, but morning use was relatively light during all seasons. Third, in terms of overall frequency, weekday and weekend use were almost equal (52% versus 48%), but there were seasonal variations in the distribution pattern; in summer, the walkways received greater use on weekdays than on weekends, whereas in fall and winter the balance shifted to weekend use, although only slightly. Fourth, the tendency to evening use was particularly evident on weekdays (27% of total use), whereas on weekends there was no difference between afternoon and evening frequencies. Weekend evenings, weekend afternoons, and weekday afternoons generated approximately the same amounts of use.

These findings, in turn, lead to three conclusions of major importance to the research problem. First, there is a definite and strong climatic influence on the frequency of walkway use in Edmonton. This is evidenced in the general decrease from summer to fall to winter, and in the low levels of use that prevail in the winter months. Second, the heaviest use of the walkways occurs at times when the greatest numbers of people are likely to have the time to use them (leisure time). The general tendencies to summer use and evening use can both be explained in this way - summer because it is a time when school children and, to a lesser extent, working adults are on holiday; and evenings because that is when most people have free time from work or school. The relative shift to weekend use in fall and winter fits this interpretation as well; that is, once summer holidays are over, weekends become relatively more important in terms of leisure time. In addition, the fact that more people are free at more times of day on weekends probably explains the even split between afternoon and evening weekend use. Taken together, these temporal patterns are a first indication that the walkways in Thorncliff and Aldergrove have come to serve an important recreational function, in addition to their role as access facilities. Moreover, much of the variation in intensity of use, and the concentration at certain times such as summer evenings, can be attributed to the recreation function.

A third factor that may come into play here is the proximity of the study neighborhoods, and Thorncliff more particularly, to West Edmonton Mall. Because of its extended hours of operation on evenings and weekends, and because it is a major recreation facility as well as a huge retail complex (Hopkins, 1991; Jackson and Johnson, 1991), it is possible that trips to and from the Mall explain some part of the temporal variations in walkway use. The possible effect of West Edmonton Mall on use patterns will be given closer consideration in Chapter 5.

4.4 WALKWAY USERS

The next step was to determine whether the temporal variations in use were related to the kinds of people who used the walkways. The age and sex characteristics of the survey population were therefore analyzed, in general first (Section 4.4.1) and then according to the three temporal indicators (Sections 4.4.2, 4.4.3, and 4.4.4). The findings in each case are discussed in their respective sections, and an interpretation of their significance is presented in a concluding section (4.4.5).

In general, the separate age-groups and sexes varied in their walkway use patterns by season, time of day, and time of week. The differences in the distributions were statistically significant, with the exception of winter use (Table 4.11) and weekend use (Table 4.19). These exceptions indicate that the use patterns of males and females of all ages in winter and on weekends were not significantly different.

4.4.1 General Age and Sex Characteristics

To analyze the general age and sex distribution of observed walkway users, the surveyed population was compared with the actual population distribution in the study area for 1987 (Tables 4.6 and 4.7). Although the age categories used to define children and teenagers in the two tables do not match exactly, they are close enough to allow a general comparison. Children were the dominant age-group among walkway users (45%), and disproportionately so when compared with the actual population distribution (23%). This dominance was chiefly accounted for by male children, who were heavily over-represented in the survey population (29% to 11%). Female children were over-represented as well, but less so than

Table 4.6
Survey population distribution: age-group by sex

Age-group	Male n	(%)	Female n	(%)	Total n	(%)
Child (0-12)	964	(29)	543	(16)	1507	(45)
Teenager (13-19)	366	(12)	182	(5)	548	(17)
Adult (20-59)	574	(17)	595	(18)	1169	(35)
Senior (60+)	53	(2)	34	(1)	87	(3)
Total	1957	(60)	1354	(40)	3311	(100)

Table 4.7
Actual population distribution: age-group by sex

Age	Male n	Male (%)	Female n	Female (%)	Total n	Total (%)
Preschool to Gr 6 (0-11)	972*	(11)	1041*	(12)	2013*	(23)
Jr./Sr. High School (12-19)	396*	(5)	434*	(5)	830*	(10)
Adult (20-59)	2499	(29)	2776	(33)	5275	(62)
Senior (60+)	169	(2)	202	(2)	371	(4)
Total	4036	(48)	4453	(52)	8489	(100)

* - these were estimated from the age group and occupation tables in the Neighbourhood Fact Sheets for Thorncliff and Aldergrove (City of Edmonton, 1987)

males (16% to 12%). A similar pattern occurred among teenagers; they, too, were over-represented in the survey population (17% to 10%), but only because of a relatively high level of use by male teenagers (12% to 5%). Altogether, young males (children and teenagers) accounted for 41% of the observed use of the walkways, which was almost twice the number recorded for young females, in spite of the fact that females comprise 52% of the combined population of Thorncliff and Aldergrove. Not only are young males the largest group of users, then, but a higher proportion of them must be frequent users, and also repeat users, than is the case with young females.

Over the whole survey population, 60% of the users were male and 40% female, proportions that held true in every instance where use by sex was analyzed (see Tables 5, 25, 26, and 27 in Appendix 2). This difference, however, was entirely accounted for by children and teenagers. Among adults and seniors, the distribution of use by sex was virtually identical. Female adults (18%) and male adults (17%) were actually the second and third largest groups of users, but they used the walkways much less frequently than their population numbers would have indicated. Seniors were the only age-group whose frequency of use was a reasonably close reflection of population size. They are a small group though, representing only 3% of the observed users.

4.4.2 Use Patterns by Age, Sex, and Season

The analyses of seasonal use are derived from four crosstabulations: age-group by season (Table 4.8); summer use by age-group and sex (Table 4.9); fall use by age-group and sex (Table 4.10); and winter use by age-group and sex (Table 4.11). The following points stand out. First, the general decrease in numbers of users from summer to fall to winter affected every age-group. This pattern was particularly evident for children, especially between summer and fall, when they accounted for 71% of the total decrease. This also reflects the fact that children dominated the summer use pattern, especially male children, who were by far the largest single group of users then. They were followed by female children, female adults, and male adults, in that order. Fall use by children and adults was more nearly equal, but male children still made up the greatest numbers; female children were then fourth. In winter, however, adults were the largest group of users; this use was evenly split between males and females.

Table 4.8
Age-group by season

Age-group	Summer n*	(%)	Fall n*	(%)	Winter n	(%)	Total n*	(%)
Child	621	(27)	335	(15)	74	(3)	1030	(45)
Teenager	190	(8)	148	(6)	40	(2)	378	(16)
Adult	382	(17)	313	(14)	128	(5)	823	(36)
Senior	27	(1)	22	(1)	14	(1)	63	(3)
Total	1220	(53)	818	(36)	256	(11)	2294	(100)

Chi square = 19.61; d.f. = 6; $p < 0.05$

n* = adjusted frequencies

Table 4.9
Summer use by age-group and sex

Age-group	Male n	Male (%)	Female n	Female (%)	Total n	Total (%)
Child	585	(32)	346	(19)	931	(51)
Teenager	186	(10)	99	(5)	285	(15)
Adult	269	(15)	303	(17)	572	(32)
Senior	23	(1)	17	(1)	40	(2)
Total	1063	(58)	765	(42)	1828	(100)

Chi square = 29.58; d.f. = 3; $p < 0.05$

Table 4.10
Fall use by age-group and sex

Age-group	Male n	Male (%)	Female n	Female (%)	Total n	Total (%)
Child	333	(27)	169	(14)	502	(41)
Teenager	152	(12)	71	(6)	223	(18)
Adult	240	(20)	229	(18)	469	(38)
Senior	21	(2)	12	(1)	33	(3)
Total	746	(61)	481	(39)	1227	(100)

Chi square = 20.44; d.f. = 3; $p < 0.05$

Table 4.11
Winter use by age-group and sex

Age-group	Male n	Male (%)	Female n	Female (%)	Total n	Total (%)
Child	46	(18)	28	(11)	74	(29)
Teenager	28	(11)	12	(4)	40	(15)
Adult	65	(25)	63	(25)	128	(50)
Senior	9	(4)	5	(2)	14	(6)
Total	148	(58)	108	(42)	256	(100)

Chi square = 5.74; d.f. = 3; not significant

4.4.3 Use Patterns by Age, Sex, and Time of Day

Four crosstabulations are presented in this section: age-group by time of day (Table 4.12); morning use by age-group and sex (Table 4.13); afternoon use by age-group and sex (Table 4.14); and evening use by age-group and sex (Table 4.15). These tables show two main points worth discussing. First, the general increase in use from morning to afternoon to evening affected every age-group, though children, once again, made the greatest contribution (50% of the total increase between morning and evening). Children also comprised the largest group of users at all times

Table 4.12
Age-group by time of day

Age-group	Morning n	Morning (%)	Afternoon n	Afternoon (%)	Evening n	Evening (%)	Total n	Total (%)
Child	322	(10)	433	(13)	752	(23)	1507	(46)
Teenager	80	(2)	198	(6)	270	(8)	548	(16)
Adult	273	(8)	408	(12)	488	(15)	1169	(35)
Senior	19	(1)	27	(1)	41	(1)	87	(3)
Total	694	(21)	1066	(32)	1551	(47)	3311	(100)

Chi square = 77.08; d.f. = 6; $p < 0.05$

Table 4.13
Morning use by age-group and sex

Age-group	Male n	(%)	Female n	(%)	Total n	(%)
Child	204	(29)	118	(17)	322	(46)
Teenager	53	(8)	27	(4)	80	(12)
Adult	119	(17)	154	(22)	273	(39)
Senior	13	(2)	6	(1)	19	(3)
Total	389	(56)	305	(44)	694	(100)

Chi square = 28.74; d.f. = 3; $p < 0.05$

Table 4.14
Afternoon use by age-group and sex

Age-group	Male n	(%)	Female n	(%)	Total n	(%)
Child	283	(26)	150	(14)	433	(40)
Teenager	126	(12)	72	(7)	198	(19)
Adult	197	(18)	211	(20)	408	(38)
Senior	17	(2)	10	(1)	27	(3)
Total	623	(58)	443	(42)	1066	(100)

Chi square = 30.47; d.f. = 3; $p < 0.05$

Table 4.15
Evening use by age-group and sex

Age-group	Male n	(%)	Female n	(%)	Total n	(%)
Child	477	(31)	275	(18)	752	(49)
Teenager	187	(12)	83	(5)	270	(17)
Adult	258	(17)	230	(15)	488	(31)
Senior	23	(1)	18	(1)	41	(3)
Total	945	(61)	606	(39)	1551	(100)

Chi square = 23.57; d.f. = 3; $p < 0.05$

of day, though the number of adult users was almost equal with them in the afternoon period. Morning and afternoon use was dominated by male children, with female adults not far behind; male adults and female children used the walkways in fairly equal numbers. By evening, however, male children were by far the largest group on the walkways, with male adults second, slightly ahead of female adults. It is also evident that the general male dominance became stronger over the course of the day, from 56% in the morning period to 61% in the evening; children, teenagers, and adults all contributed to this trend.

Second, the fact that adult females used the walkways in slightly greater numbers than adult males in the morning and afternoon, a pattern that was reversed in the evening, suggested that these women might be housewives, staying home with the children while their husbands went to work. Since this was a specific expectation of the West Jasper Place plan, a separate test was devised to determine if this 'housewife theory' was realistic. It focused on weekday use by adult males (men) and females (women) (Table 4.16). Morning and afternoon use by each adult sex was combined and then compared with their evening use. It was hypothesized that if the adult female users were indeed housewives, then women should use the walkways more frequently than men during the day, and equal to or less than men in the evening. In terms of the numbers of users, this was true, and chi square testing confirmed that the differences were significant. Although this result must be viewed with some caution, because the chi square value was not a great deal larger than the critical value, it is reasonable to conclude that women using the walkways during day-time hours on weekdays tended to be housewives, probably staying home to take care of their children.

Table 4.16
Weekday walkway use: sex by time of day

Sex	Morning and Afternoon n	(%)	Evening n	(%)	Total n	(%)
Male	170	(42)	180	(52)	350	[illegible]
Female	235	(58)	166	(48)	401	(53)
Total	405	(100)	346	(100)	751	(100)
Chi square = 7.57; d.f. = 1; $p < 0.05$						

4.4.4 Use Patterns by Age, Sex, and Time of Week

The analyses in this section are derived from three crosstabulations: age-group by time of week (Table 4.17); weekday use by age-group and sex (Table 4.18); and weekend use by age-group and sex (Table 4.19). Two major points are apparent from these tables. First, the

Table 4.17
Age-group by time of week

Age-group	Weekday n*	(%)	Weekend n	(%)	Total n*	(%)
Child	632	(26)	453	(19)	1085	(45)
Teenager	220	(9)	182	(8)	402	(17)
Adult	451	(19)	418	(17)	869	(36)
Senior	34	(1)	30	(1)	64	(2)
Total	1337	(55)	1083	(45)	2420	(100)
Chi square = 8.05; d.f. = 3; $p < 0.05$						

n* = adjusted frequencies

Table 4.18
Weekday use by age-group and sex

Age-group	Male n*	Male (%)	Female n*	Female (%)	Total n*	Total (%)
Child	412	(31)	221	(16)	633	(47)
Teenager	145	(10)	74	(6)	219	(16)
Adult	210	(16)	241	(18)	451	(34)
Senior	20	(2)	14	(1)	34	(3)
Total	787	(59)	550	(41)	1337	(100)

Chi square - 43.18; d.f. - 3; $p < 0.05$

n* - adjusted frequencies

Table 4.19
Weekend use by age-group and sex

Age-group	Male n	Male (%)	Female n	Female (%)	Total n	Total (%)
Child	278	(26)	175	(16)	453	(42)
Teenager	124	(11)	58	(5)	182	(16)
Adult	224	(21)	194	(18)	418	(39)
Senior	19	(2)	11	(1)	30	(3)
Total	645	(60)	438	(40)	1083	(100)

Chi square - 6.67; d.f. - 3; not significant

proportion of use during the week was approximately equal to that of weekends for every age-group except children. Use by male children was the reason for this difference because they accounted for more of the total use then (31% as compared with 26% at weekends). Adult males, on the other hand, increased their share of total use from 16% on weekdays to 21% at weekends. The proportions of use among all female age-groups, plus male teenagers and seniors, were essentially unchanged.

Second, when measured by frequency of use, male children were the largest group of users during both times of the week, but especially on weekdays. On weekdays, the next largest groups, female children and male and female adults, ranked well below male children. On weekends, however, adult males were closer behind; they then outnumbered both female adults and female children.

4.4.5 Conclusions

These findings lead to four conclusions. First, further evidence is provided for the climatic influence on frequency of use, since use by every age-group decreased from summer to fall to winter. Second, the conclusion that the heaviest use occurs when the greatest number of people have free time is reinforced. Although all age-groups shared in the general tendencies to summer and evening use, it was children, and above all male children, who accounted for the greatest amounts of use in both periods. Decline in use from summer to fall was also greatest for children, as they went back to school. Use by adults became more prevalent in the fall and winter, probably because they are better able to withstand the cold. Third, in every instance where the four age-groups are analyzed in a crosstabulation, there was a general pattern of high use by male children and comparatively low use by female children. This general pattern is perhaps an indication that parents felt the walkways were less safe for girls than boys. Fourth, there was an indication that the women using the walkways during the day were very likely housewives. Adult males made their greatest use of walkways on evenings - and relatively more use at weekends than on weekdays. Use patterns for adult females did not vary as much by time of day and time of week.

4.5 WALKWAY ACTIVITIES

The final variable involves the kinds of uses that occurred on the walkways, in terms of both age and sex characteristics (Section 4.5.1) and temporal indicators (Section 4.5.2). Besides knowing when the walkways were being used, and who used them, it is desirable to know what types of activities were popular on them. Once again, the separate findings will be discussed in their respective sections, and their significance for this research will be discussed in a concluding section (4.5.3). In all cases, the differences in the distributions were statistically significant.

Among the many activities observed on the walkways (Table 6 in Appendix 2), the two most frequent were walking (51%) and riding bicycles (29%). The next three activities occurred less than 10% of the time; they included playing on the walkway, walking the dog, and pushing a baby stroller. In addition, twelve other walkway activities were recorded during the observation period: running/jogging, skateboarding, sitting in a wheelchair, rollerskating, mowing the lawn beside the walkway, pushing a scooter, riding in a wagon, pulling a baby sled, sitting beside the walkway, driving a vehicle on the walkway, walking a cat, and moving furniture into an apartment. In total, they amounted to only 4% of walkway use, and have therefore been omitted from the crosstabulations.

4.5.1 Walkway Activity by Age and Sex Characteristics

The analyses of walkway activity by age and sex characteristics are derived from four crosstabulations: walkway activity by age-group (Table 4.20), walkway activity by sex (Table 4.21), female walkway activity by age-group (Table 4.22), and male walkway activity by age-group (Table 4.23). These tables show three main points worth noting. First, the most popular use for the walkways in every instance was walking, with riding bicycles next. Second, the greatest amount of use on the walkways was by walking adults (24%), followed by children walking and children riding bicycles (18% each). In fact, children rode bicycles in greater numbers than any other age-group, probably because they are the most likely group of people to have them and, more importantly, to use them. Adults did not ride bicycles much; they walked their dogs as much as they rode bicycles. Third, males and females overall walked in fairly equal numbers, but males rode bicycles much more than females. Bicycle use by male children is the reason for this; they accounted for 46% of all bicycle use, compared with 15% for female children.

Table 4.20
Leading walkway activities by age-group

Activity	Child n	Child (%)	Teen n	Teen (%)	Adult n	Adult (%)	Senior n	Senior (%)	Total n	Total (%)
Walk	557	(18)	312	(10)	767	(24)	51	(2)	1687	(54)
Bicycle	575	(18)	195	(6)	159	(5)	16	(0)	945	(29)
Play	202	(6)	9	(0)	6	(0)	0	(0)	217	(6)
Walk dog	17	(1)	15	(0)	150	(5)	18	(1)	200	(7)
Stroller	54	(2)	4	(0)	48	(2)	0	(0)	106	(4)
Total	1405	(45)	535	(16)	1130	(36)	85	(3)	3155	(100)

Chi square = 668.00; d.f. = 12; $p < 0.05$

Table 4.21
Walkway activity by sex

Activity	Male n	Male (%)	Female n	Female (%)	Total n	Total (%)
Walk	884	(28)	803	(25)	1687	(53)
Bicycle	684	(22)	261	(8)	945	(30)
Play	134	(4)	83	(3)	217	(7)
Walk dog	103	(3)	97	(3)	200	(6)
Stroller	37	(1)	69	(2)	106	(3)
Total	1842	(58)	1313	(42)	3155	(100)

Chi square = 130.02; d.f. = 4; $p < 0.05$

Table 4.22
Female walkway activity by age-group

Activity	Child n	(%)	Teen n	(%)	Adult n	(%)	Senior n	(%)	Total n	(%)
Walk	263	(20)	121	(9)	398	(30)	21	(2)	803	(61)
Bicycle	141	(11)	45	(4)	70	(5)	5	(0)	261	(20)
Play	78	(6)	3	(0)	2	(0)	0	(0)	83	(6)
Walk dog	6	(1)	8	(1)	77	(6)	6	(1)	97	(8)
Stroller	31	(2)	3	(0)	35	(3)	0	(0)	69	(5)
Total	519	(40)	180	(14)	582	(44)	32	(2)	1313	(100)

Chi square = 222.52; d.f. = 12; $p < 0.05$

Table 4.23
Male walkway activity by age-group

Activity	Child n	(%)	Teen n	(%)	Adult n	(%)	Senior n	(%)	Total n	(%)
Walk	294	(16)	191	(11)	369	(20)	30	(2)	884	(49)
Bicycle	434	(24)	150	(8)	89	(5)	11	(0)	684	(37)
Play	124	(7)	6	(0)	4	(0)	0	(0)	134	(7)
Walk dog	11	(0)	7	(0)	73	(4)	12	(1)	103	(5)
Stroller	23	(1)	1	(0)	13	(1)	0	(0)	37	(2)
Total	886	(48)	355	(19)	548	(30)	53	(3)	1842	(100)

Chi square = 429.74; d.f. = 12; $p < 0.05$

4.5.2 Walkway Activity by Temporal Indicators

The analysis of walkway activity by temporal variables is derived from three crosstabulations: walkway activity by season (Table 4.24), walkway activity by time of week (Table 4.25), and walkway activity by time of day (Table 4.26). From these tables, there are four points worth mentioning. First, the relative importance of walking and riding bicycles as the two most popular activities h ld true for both times of the week, all times of the day, and for two of the three seasons (summer and fall). Second, amounts of use for every activity were greatest in the summer and lowest in winter. Riding bicycles showed the greatest seasonal variation, with summer being by far the most popular season; riding bicycles was only slightly less popular than walking then. In fall and winter, however, the number of people riding bicycles declined very sharply, much more so than walking. Third, walking and riding bicycles both occurred in greater amounts on weekdays than weekends, probably because of the prevalence of weekday evening use discussed earlier. Fourth, the levels of use for walking and riding bicycles increased from morning to afternoon to evening; the other 3 activities remained constant or increased only slightly in the evening period.

Table 4.24
Walkway activity by season

	Summer		Fall		Winter		Total	
Activity	n*	(%)	n*	(%)	n	(%)	n*	(%)
Walk	545	(25)	463	(21)	173	(8)	1181	(54)
Bicycle	451	(21)	175	(8)	5	(0)	631	(29)
Play	66	(3)	59	(3)	31	(1)	156	(7)
Walk dog	58	(3)	55	(3)	32	(1)	145	(7)
Stroller	38	(2)	33	(1)	0	(0)	71	(3)
Total	1158	(54)	785	(36)	241	(10)	2184	(100)
Chi square = 185.73; d.f. = 8; $p < 0.05$								

n* = adjusted frequencies

Table 4.25
Walkway activity by time of week

Activity	Weekday n*	(%)	Weekend n	(%)	Total n*	(%)
Walk	680	(30)	553	(24)	1233	(54)
Bicycle	389	(17)	296	(13)	685	(30)
Play	90	(4)	67	(3)	157	(7)
Walk dog	64	(3)	93	(4)	157	(7)
Stroller	52	(2)	19	(0)	71	(2)
Total	1275	(56)	1028	(44)	2303	(100)
Chi square = 23.55; d.f. = 4; $p < 0.05$						

n* = adjusted frequencies

Table 4.26
Walkway activity by time of day

Activity	Morning n	(%)	Afternoon n	(%)	Evening n	(%)	Total n	(%)
Walk	377	(12)	592	(19)	718	(23)	1687	(54)
Bicycle	152	(5)	294	(9)	499	(16)	945	(30)
Play	42	(1)	32	(1)	143	(5)	217	(7)
Walk dog	58	(1)	61	(2)	81	(3)	200	(6)
Stroller	37	(1)	34	(1)	35	(1)	106	(3)
Total	666	(20)	1013	(32)	1476	(48)	3155	(100)
Chi square = 90.49; d.f. = 8; $p < 0.05$								

4.5.3 Conclusions

These findings lead to four general conclusions. First, the prevalence of riding bicycles in summer, and the accompanying sharp decrease in fall and again in winter, provides further evidence of the climatic influence on use patterns. Walking, too, decreased somewhat in fall and then more significantly in winter, though walking was still the dominant activity in the winter season. Second, use in every activity was greatest during the summer and in the evening, further support for the idea that the heaviest use occurs when people are at leisure. Third, the general pattern of high use by male children and low use by female children held true. In particular, the number of boys riding bicycles was about 3 times the number of girls, but boys walked only slightly more than girls. Even taking into account the fact that a larger number of males was observed on the walkways, the difference in activity patterns between boys and girls is significant; where boys show a strong tendency to ride bicycles (49% of all activity by male children), girls show a stronger preference for walking (51% of all activity by female children). This could be an indication that boys are allowed and encouraged to ride bicycles more than girls, because that is part of being a boy in our society. Adults and seniors showed even stronger tendencies towards walking, especially when comparable activities (e.g. walking a dog) are included. Fourth, it is possible that the chosen activities, especially in Thorncliff, were affected by the proximity of the neighborhood to West Edmonton Mall. This is addressed further in Chapter 5.

4.6 SUMMARY AND EVALUATION

One simple way to summarize all this information is to present profiles of a series of 'typical' walkway users and groups of users. These profiles will serve to illustrate how walkway use varied by temporal indicators, users, and activities.

A. The following users (in order) would be typical of general overall use (all three temporal indicators combined), summer use, fall use, total weekday use, and weekday use for summer and fall:

Morning or Afternoon:

1. a male child, riding a bicycle;
2. a female child, walking;
3. a female adult, walking (very likely with one or both of the above children).

Evening:

1. a male child, riding a bicycle;

2. a female child, walking;
3. a male adult, walking (very likely with one or both of the above child·en).

B. The following users would be typical of total weekend use, and fall weekend use; all three profiles would be equally typical:

1. a male child, riding a bicycle, and a male adult, walking, in the afternoon or evening;
2. a female child and a female adult, both walking, in the afternoon or evening;
3. all four people together (male and female child, male and female adult) in the afternoon or evening.

C. The following users would be typical of winter use:

1. on weekdays: a female adult, walking in the morning or afternoon;
2. on weekends: a male or female adult, walking in the morning or afternoon.

These actual use profiles can be compared directly with the walkway policy objectives from the West Jasper Place plan. The primary purpose of the walkways under the plan was to provide access to local facilities for those people who were not likely to have regular use of a car - in particular, preschool and school-age children, housewives, and the elderly. As the user profiles demonstrate, this purpose was largely met because children and female adults were among the most important users of the walkway networks in Thorncliff and Aldergrove. In fact, children made up the largest group of observed users at all times of the day, during both times of the week, and over summer and fall. This is important because, even though trips to and from school were excluded in this part of the research, children still comprised the largest number of users in the study area at most times. The analysis also showed that female adults (housewives) were important users during the day-time. Use by seniors, although in proportion to their population size, should have been greater than it was because the walkways were supposed to provide them with better access to local facilities such as bus stops. In that sense, seniors did not use the walkways as much as expected.

Children and adults were not the only important users, however, nor was their use of the walkways limited to times or activities that clearly indicated that access to service facilities was their principal concern. Adult males, for example, used the walkways in fairly large numbers in the evening and on weekends, as did male teenagers. Adult females also used the walkways during these times, although not as much as during the day-time. Use by these groups during these times is important because it shows that the types of users were more broadly based than the planners had originally envisaged.

In terms of temporal variations, levels of use were expected to be fairly evenly distributed throughout the day and the year, because it was assumed that the expected users would be available to use the walkways whenever they wished. Weekday use, however, was expected to be greater than weekend use because it was assumed that most of the same users would have access to cars on weekends; they were also expected to be making less use of neighborhood services, such as schools and shops. But while access to service facilities was a primary planning concern, it quickly became evident that the walkways in Thorncliff and Aldergrove were also being used for recreational purposes. The first indications of this emerged during the observation sessions, when children were seen playing on the walkways, people were walking with baby strollers, and adults were strolling with their dogs. The more systematic indications of recreational behavior from the data analyses included the significant amount of use by all the age-groups (especially adults and children) during summer holidays, in the evening overall, during fall evenings and weekends, and on winter weekends. These particular concentrations occurred at times when people were most likely to be home from work or school, and thus free to use the walkways at their leisure. In summer, it is entirely reasonable that people would want to spend a great deal of time outdoors, since that is when children are out of school and adults take time off work for holidays. The opportunities for recreational pursuits are obviously at their greatest during this season. It is also reasonable that fall use would be greatest on weekday evenings and weekends. Since children are back at school and adults at work, these are the times when people are home and free to use the walkways. The colder weather and shorter days of winter decreased use by all age-groups dramatically, but weekend use was greater than weekdays because any relatively warm weekend in winter is likely to encourage people to take advantage of the chance to go outdoors, even if only for a short period. The common point is that the greatest use in every season occurred at a time when people were most likely to have free time. The result is a very strong indication of recreational use of the walkways in Thorncliff and Aldergrove, a use that is in addition to their access function.

In terms of activities, walking was expected to dominate on the walkways, an expectation that held true in the actual use patterns. Among those who walked, adults comprised the largest group of users. In addition, however, riding bicycles was popular, especially among male children. Although large proportions of both walking and riding bicycles were probably for the purpose of gaining access to service facilities, much of the observed activity was undoubtedly recreational. For example, children (especially preschool children) were more likely to be riding bicycles for fun than for the purpose of getting somewhere. In addition, although it was often difficult to determine whether the walking adults were heading toward a local service facility or merely out for a stroll, those who were observed walking their dogs or pushing baby strollers were very likely walking for enjoyment. The final major indication of recreational activity was in the number of children who were observed playing on and around the walkways. While the initial design of the walkways in the West Jasper Place plan showed children's play lots along the networks (Figure 3.3), they were never built, an unfortunate oversight given the frequency with which children were observed playing on the walkways.

The single most important conclusion from the analysis in this chapter is that the actual use patterns on the walkways in Thorncliff and Aldergrove were considerably more varied than was anticipated by the West Jasper Place plan. That is, they were more varied in time, more varied in types of users, and more varied in the activities that people engaged in than the planners expected. The major shortcoming of the walkways was not in who used them or which activities were most prevalent, but in the fact that season had a profound effect on the amount of use that they enjoyed. However, that is a consequence of living in a northern city with a continental climate; the amounts of use that occurred during other times of the year easily make up for the low level of winter use. In conclusion then, although the explicit intentions of the West Jasper plan were not fully achieved, the amount and diversity of use that occurred during the observation sessions was significant in itself. The walkways were obviously valued by the residents of Thorncliff and Aldergrove, and so are a valuable component of the planning effort to enhance the residential environment in these neighborhoods.

CHAPTER 5

OBSERVED WALKWAY USE:
SPATIAL PATTERNS OF USE

5.1 INTRODUCTION

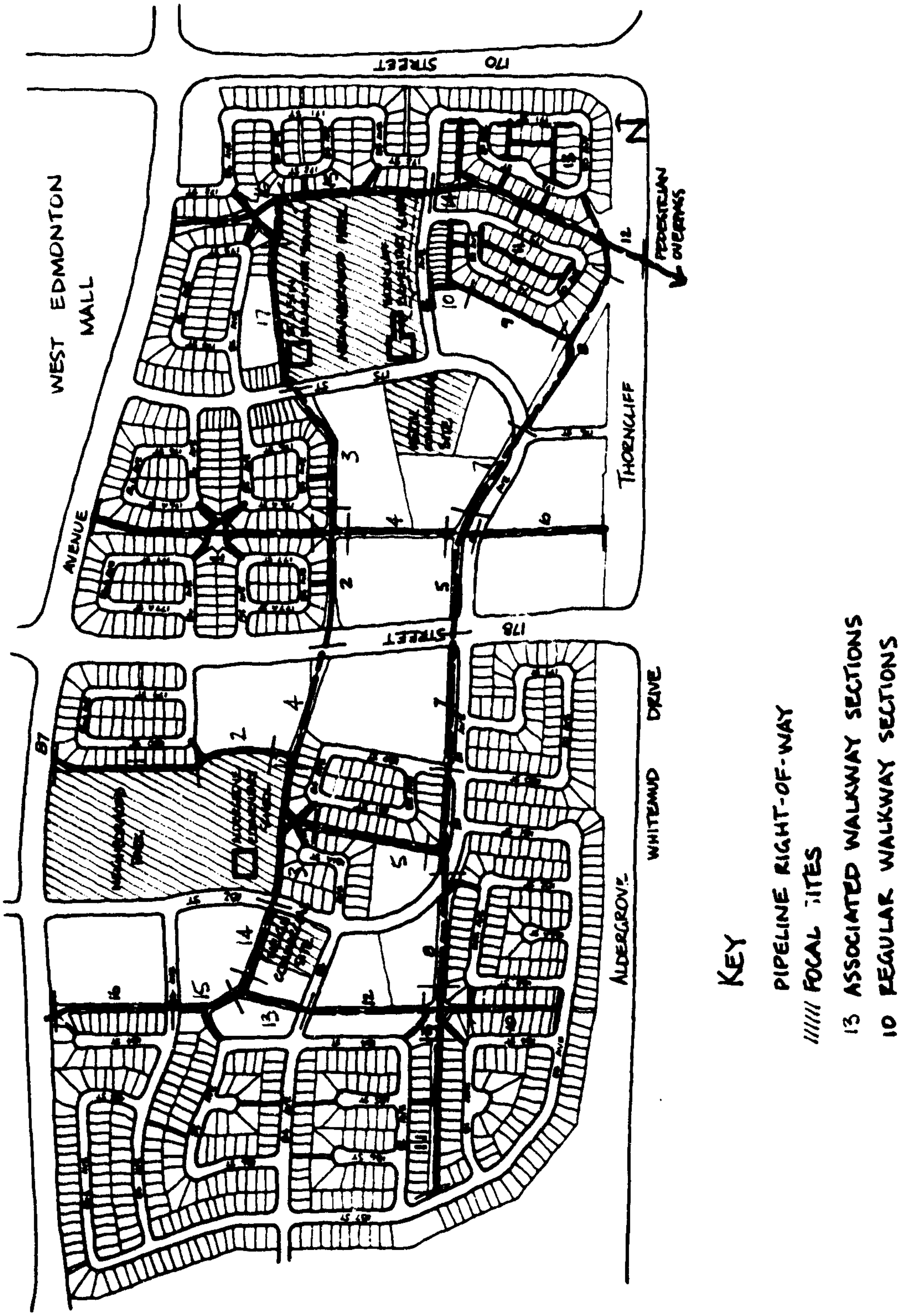
This chapter addresses the third research objective, which is to evaluate the spatial layouts of the walkway networks within Thorncliff and Aldergrove. It became clear during the observation sessions that some sections of the networks were used more than others, so this chapter examines the measured variations to determine if intensity of use was affected by walkway layout. The evaluative question here, relating back to the general principles of walkway network planning, is whether the networks in Thorncliff and Aldergrove provide logical and functional path layouts for access purposes at two areal scales, intra-neighborhood and inter-neighborhood. The data base, once again, was the observation record.

5.2 WALKWAY LAYOUT AND OVERALL PATTERNS OF USE

The spatial patterns of use in Thorncliff and Aldergrove were indeed affected by the layouts of the respective walkway networks. While the network in Aldergrove is laid out in such a way that pedestrian traffic can generally be channeled toward the neighborhood service facilities (the red shaded areas in Figure 5.1), that is not the case in Thorncliff. Although some of the walkways in Thorncliff are adjacent to the site containing the schools and neighborhood park, most of them do not lead there directly and none of them go near the local convenience commercial area. For that matter, even in Aldergrove there are walkways that do not focus directly on the local service sites, although the West Jasper Place plan presented this as one of its most basic principles.

The explanation for the discrepancy rests in two other principles that had to be accommodated in the final neighborhood plans. First, there was the general requirement that existing site features should be incorporated into the walkways. In the case of Thorncliff and Aldergrove, this meant a pipeline right-of-way, which runs from west to east through

Figure 5.1
Neighborhood focal sites and associated walkway sections

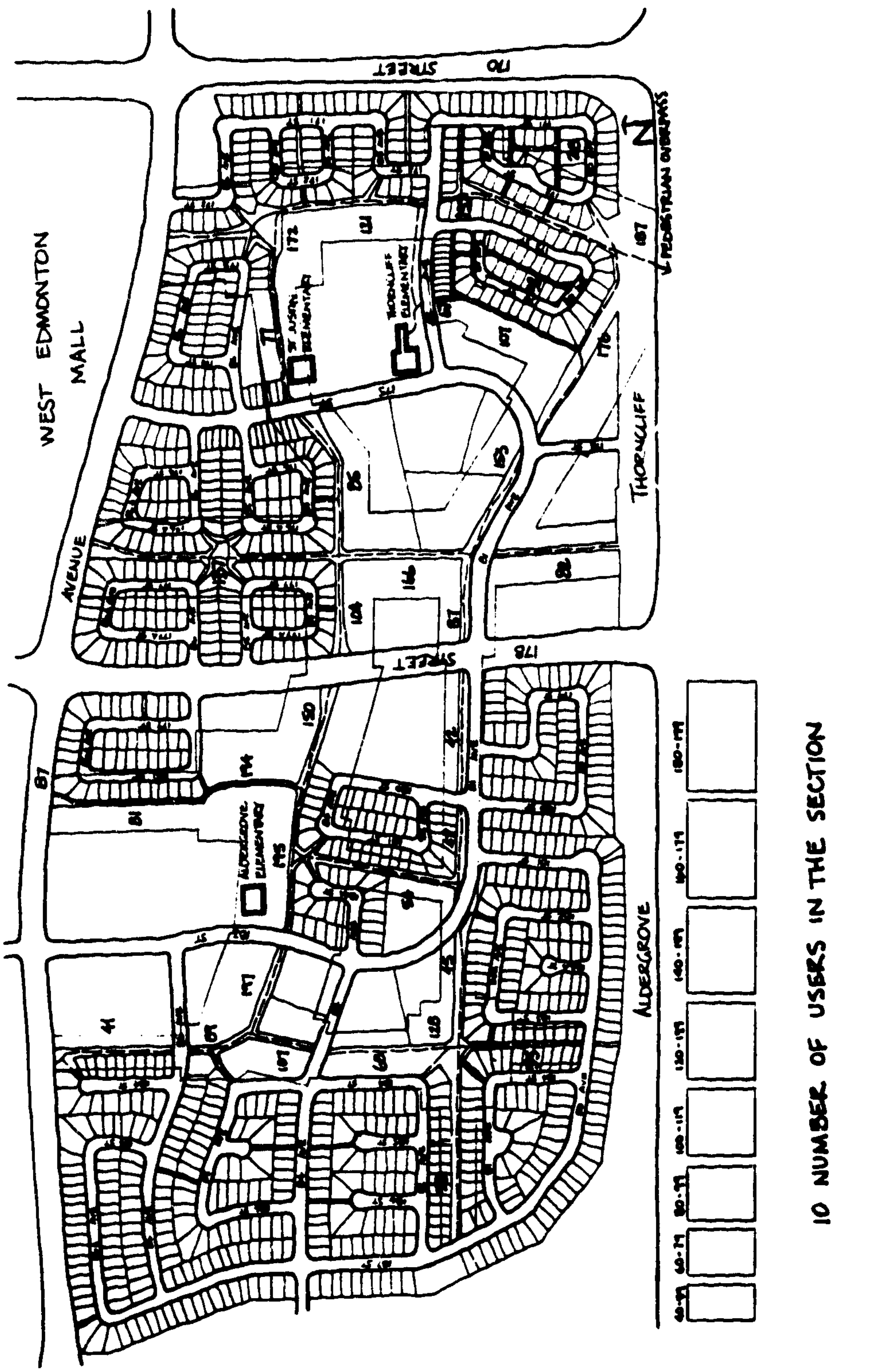


both neighborhoods before angling south-east across Whitemud Drive (highlighted yellow in Figure 5.1). None of the service facilities in either neighborhood is located on this right-of-way. Second, the walkway network was to be continuous throughout West Jasper Place (see Figure 3.2), so that individual neighborhoods would be connected with higher-order service facilities, such as high schools and district shopping centers. This is reflected in the Thorncliff and Aldergrove walkways, which not only connect with each other but provide for north-south connections as well. Under the original plan, the latter was especially important; because of West Jasper Place's elongated shape, the north-south walkways through Thorncliff and Aldergrove were essential links in the district network, connecting the northern neighborhoods with the planned town center complex south of Whitemud Drive.

The construction of West Edmonton Mall was a major departure from the West Jasper Place plan (Smith, 1991). It had three main implications for the walkway networks in Thorncliff and Aldergrove, both of which were built before the Mall was proposed. First, since West Edmonton Mall took over the entire southern half of the planned Summerlea neighborhood, the walkway connection north from Thorncliff was broken. The walkways in Aldergrove, however, continue into the adjoining neighborhood of Belmead. Second, the planned town center did not develop as envisaged, greatly reducing the potential for Thorncliff and Aldergrove residents to travel southwards, or for their walkways to be used as through routes from the neighborhoods further north. Instead, third, West Edmonton Mall was a potential pedestrian and cycling destination in its own right. This applied not only to people from Thorncliff and Aldergrove, but for those living south of Whitemud Drive as well, once an overpass was built.

The probable effects of these developments on the patterns of use of the Thorncliff and Aldergrove walkways can be inferred from Figure 5.2. Although this map suggests flow patterns, it is not actually a flow map because travel distances and directions of movement were not recorded on the observation schedule. Nonetheless, there is a definite indication of continuity between neighborhoods, both east-west continuity between Thorncliff and Aldergrove and north-south continuity from Aldergrove to Belmead and through Thorncliff. From this evidence, it appears that the

Figure 5.2
Total overall walkway use



network layouts in the study area do indeed provide effective linkages at the inter-neighborhood scale, as the West Jasper Place plan intended. It also seems probable, however, that the value of the north-south walkways was enhanced by the development of West Edmonton Mall. Some of the highest levels of use were recorded on walkway sections with a north-south orientation, and the stretches of the network that can be used to channel traffic most directly to West Edmonton Mall accounted for 49% of total observed use. (These sections were 1, 4, 6, 7, 8, 12, 14, 15, and 16 in Thorncliff and 1 and 2 in Aldergrove; see Figure 5.1.) In combination with the fact that 58% of total observed use in the study area occurred in Thorncliff, it is suggested that these north-south walkways were being used in part as an access corridor to West Edmonton Mall from neighborhoods south of Whitemud Drive. The high volume of traffic at the north end of the overpass is particularly striking. It carries a clear suggestion of traffic from the south being funnelled across Whitemud Drive and then diverging onto two alternative routes through Thorncliff.

This interpretation has its limitations, of course. The data do not allow movement in and out of the study neighborhoods to be differentiated from purely internal movements. For instance, it is probable, given the conclusions from Chapter 4, that some of the people recorded on the north-south walkways were using them for recreational activities. It is even possible, as Figure 5.2 again suggests, that the walkways in Thorncliff and Aldergrove are treated as part of an extended circuit by people pursuing recreational activities, especially cyclists. On the other hanc, there are pronounced variations in levels of use among the 33 walkway sections (Table 5.1), with some sections falling well below the average of 100 observed users. To some extent, this can be explained by the peripheral location of secondary walkways; section 16 in Aldergrove, for example, or sections 11 and 13 in Thorncliff. The one continuous series of walkways that shows consistently low use throughout its length, however, is the one aligned along the pipeline right-of-way in southern Aldergrove. This is a route that leads nowhere in particular; the paths do not provide a good quality experience either, because they are open and usually fairly windy. They do not appear to serve an important function, for either recreation or access. In contrast, the most concentrated group of high-

Table 5.1
Frequencies of use

Levels of use	Number of sections
Less than 50	6
50-100	11
101-150	8
More than 150	8
Total	33

volume walkways in either of the study neighborhoods comprised the sections immediately adjoining the shopping center and elementary school in Aldergrove. In this neighborhood, at least, it appears that the walkway layout may indeed provide effective access to local service facilities. To test that possibility more systematically, a separate measure was devised; its application is discussed in the next section.

5.3 THE LOCAL ACCESS INDEX

The 'local access index' is a calculation developed to indicate the degree of access-oriented use on the walkways in Thorncliff and Aldergrove. Ideally, if the walkways were access-oriented, then the patterns of use in each neighborhood would be concentrated around its service facilities (focal sites). In such a case, the highest levels of use would occur on those walkway sections most closely associated with the neighborhood focal sites, where the traffic flows from all parts of the network converge.

In Aldergrove, the focal sites were the neighborhood commercial area, Aldergrove Elementary School, and the neighborhood park; in Thorncliff, they were the neighborhood commercial area, and the site shared by St. Justin Catholic School, Thorncliff Community School, and the neighborhood park (the red shaded areas in Figure 5.1). In each case, eight walkway sections were identified as being most closely associated with these focal sites (Table 5.2 and Figure 5.1) based on one of three criteria. First, the section was connected directly with a focal site. Section 14 in Aldergrove, for example, provides pedestrian access to the neighborhood commercial site, and sections 1, 2, and 3 immediately flank

Table 5.2
Walkway sections associated with the focal sites

Aldergrove	1,2,3,4,5,13,14,15
Thorncliff	3,4,7,10,14,15,16,17

the neighborhood park and school site; similarly, sections 15, 16, and 17 in Thorncliff abut directly onto the combined school and park site. Second, the walkway section provided indirect access to a focal site, either across a street or through a section already directly associated with the focal site. Sections 10 and 14 in Thorncliff join the park and school site across a street; sections 4 and 5 in Aldergrove connect with the sections directly adjoining the park and school site, and sections 13 and 15 join the section that provides access to the neighborhood commercial site. Third, the section was the one closest to the focal site, even though it might not provide direct access. This occurs only in Thorncliff, where sections 3, 4, and 7 provide the closest access to the neighborhood commercial site.

The patterns of pedestrian use in each neighborhood were then plotted in a series of traffic volume maps, which showed the spatial distribution of walkway use throughout the neighborhood sections. Absolute (n) numbers of users were shown on the maps rather than percentages to produce a realistic picture of overall use and to better compare and analyze the relationships between the walkway sections and the focal sites. In total, over thirty maps were generated from the walkway use variables (based on users, temporal indicators and activities). All the maps showed the same basic patterns, so only the map showing total overall use (Figure 5.2) has been included here.

The calculation procedure was as follows. For each variable the ten sections in each neighborhood with the greatest amount of use were identified; any remaining sections were ignored. These 'highest-use' sections were considered to be 'access-oriented' if they were also one of the eight 'associated sections'. The access index was calculated by summing the number of users from the access-oriented sections and then expressing that as a percentage of the total number of users from the ten highest-use sections. For example, if the total number of users in the highest-use sections was 100, and 75 of them were on access-oriented sections, then the access index for that variable in that neighborhood was 75. For these purposes, an access index of 65 or more meant that the tendency in that neighborhood for that variable was considered to be toward access, or 'access-oriented'. This value was chosen because it indicated that at least two-thirds of use in the ten highest-use sections occurred on those walkway sections that were most closely associated with the focal sites. The calculation was repeated for each walkway use variable in each neighborhood.

This method is not without difficulties, some of which became apparent during the development of the procedure for the access function index. The procedure therefore went through several revisions as it was refined, simplified and improved. In the end, ten sections were used in the analysis because I wanted to ensure that at least two of the highest use sections would not be access-oriented. Even so, the calculation intentionally favored access-oriented use because the walkways were intended for that purpose, and so that was what I had to measure. In order for any other pattern to come out of the analysis, it would have to be a fairly strong one. Still, the index can only suggest a <u>tendency</u> toward access; it does not permit clear-cut statements about walkway function. That is why the results are discussed in terms of access-<u>oriented</u> patterns.

The results, which are summarized in Table 5.3, are generally consistent across the variables. In terms of total network use, the access index in Aldergrove was 80, as compared with 43 in Thorncliff. Obviously then, Aldergrove showed a much stronger access-oriented pattern than Thorncliff. These different patterns of use are illustrated in Figure 5.2, from which it is clear that walkway use in Aldergrove was concentrated around the focal sites, whereas in Thorncliff it was more evenly distributed throughout the neighborhood.

In terms of the individual walkway use variables (Table 5.3), the Aldergrove indexes ranged from 66 to 88, which means that none fell below the critical value of 65; in Thorncliff, where none of the variables reached the critical value, the indexes ranged from 37 to 60. In every

Table 5.3
Access indexes in Thorncliff and Aldergrove

Variable	Access Index Thorncliff	Access Index Aldergrove
Total Use	43	80
Children	37	88
Teenagers	49	70
Adults	49	76
Seniors	*	*
Males	40	75
Females	57	81
Male Children	51	84
Female Children	57	80
Male Teenagers	53	66
Female Teenagers	46	72
Male Adults	48	69
Female Adults	47	71
Male Seniors	*	*
Female Seniors	*	*
Walking	44	81
Riding Bicycles	59	78
Morning	41	79
Afternoon	50	80
Evening	59	82
Weekday	51	82
Weekend	60	76
Summer	57	79
Fall	51	81
Winter	51	66

Note: Variables shown by the * had insufficient data for analysis.

case, therefore, the indication was that walkway use was access-oriented in Aldergrove, but not in Thorncliff.

5.4 EVALUATION

The results from this chapter indicate that the general planning objective of a logical and functional network layout was only partially achieved in Thorncliff and Aldergrove. First, in terms of access to neighborhood service facilities, only the Aldergrove network includes paths that lead more or less directly to the facility sites. The greatest volumes of walkway traffic were also recorded on those sections that converged on the center. This does not necessarily mean that all their use was for access purposes - it is impossible to know that from the observation data - but the spatial pattern of traffic volumes supports the conclusion that the Aldergrove network gives reasonably convenient access to local services. In Thorncliff, on the other hand, the network layout is not well-related to neighborhood service facilities. In contrast to Aldergrove's pattern of convergence on the center, walkway use in Thorncliff is more evenly distributed over the network. Its layout does not facilitate access to service facilities at the neighborhood scale, a point that will be returned to in Chapter 6.

Taken together, the two networks are probably more successful at providing inter-neighborhood connections, though here too there are qualifications. In the Aldergrove case, while Figure 5.2 conveys a definite suggestion of continuous flows to both Belmead and Thorncliff, the east-west route along the pipeline right-of-way does not follow a functional path; it is only lightly used as a result. In Thorncliff, where the total number of observed users was almost 50% greater than in Aldergrove, it seems probable that the use pattern was distorted by the proximity of West Edmonton Mall. A strong north-south orientation is evident in the mapped pattern of traffic volumes, so it is reasonable to conclude that the Thorncliff walkways are functioning to some extent as a throughway or corridor. This is a fortuitous circumstance, however; it is not something that was planned for when the network was designed.

From a physical planning standpoint, this interpretation of the spatial patterns of use highlights the practical difficulty of designing networks that focus on local service destinations while also providing for inter-neighborhood continuity (access to higher level service facilities) and incorporating site features such as pipeline rights-of-way. In the former case, local access and district-wide access may very well be incompatible. The orientation of the two pedestrian desire lines in Figure 3.1, for instance, suggests that they may actually work against each other. In addition, incorporating a pipeline right-of-way is useful only if it is aligned so that it matches with the desired route patterns or is well-related to local service destinations. In Thorncliff, for example, the right-of-way is useful because it became part of the linkage to West Edmonton Mall; in Aldergrove, however, it goes nowhere. The practical difficulties of satisfying these different policies had a clear influence on walkway use in the study area.

CHAPTER 6

ELEMENTARY SCHOOL CHILDREN MAPPING SURVEY

6.1 INTRODUCTION

The fourth research objective, which is the subject of this chapter, was to assess the use that elementary school children from Thorncliff and Aldergrove make of the walkways on their daily journeys to school. The larger evaluative purpose here, derived directly from the West Jasper Place plan, was to judge the effectiveness of the network layouts in terms of their convenience and safety for school children. On the face of it, these are fundamentally different criteria, yet in practice, as explained in Section 1.1, they are usually merged. That is, it is generally assumed that separated walkways that follow the most direct paths to service destinations, such as schools, will be both convenient and safe. In view of the difficulty of separating the two objectives in their practical applications, the analysis in this chapter will focus on the convenience of the walkway networks, although the safety issue does receive some consideration. Specifically, an attempt was made to determine if safety was an important concern for the children themselves, in their choice of route to school.

The data for the evaluation were obtained by administering a mapping exercise and survey to the children at the two elementary schools in one of the study neighborhoods. The first section of the chapter outlines the methods of research used for this survey. The methodological literature concerning the map-reading abilities of elementary school children is reviewed, followed by the procedure for setting up and administering the mapping exercise, and a description of the analytical method. The second section presents the results of the analyses and attempts to explain why the identified use patterns occurred. It is divided into three areas of analysis based on the following aspects of use by the school children: 1) distribution among neighborhood sections, 2) mapped route patterns, and 3) reasons for chosen routes. The chapter concludes with an evaluation of the Thorncliff network from the perspective of children walking to school.

6.2 RESEARCH METHODS

6.2.1 Theory of Map-Reading by Elementary School Children

The most important studies of the map-reading abilities of elementary school children were conducted in the late 1960s and early 1970s. In the initial studies, children from kindergarten to grade six were asked to identify features on an aerial photograph. Almost all could identify simple features such as cars or trucks, roads, houses, and trees (Blaut, McCleary, and Blaut, 1970; Blaut and Stea, 1971). The same researchers then asked first-grade children to identify features on an aerial photograph, trace them to compose a simple map, name and color-code the shapes on the tracing, and then draw a route along the roads between two houses. Most of the children had no difficulty accomplishing this task (Blaut, McCleary, and Blaut, 1970; Blaut and Stea, 1971). Muir (1970), too, used aerial photographs to teach first-grade children how to read and draw maps. They learned to recognize and use simple map features and symbols such as scales, standard map signs, and color-coded land use indicators. The success of these projects was proof that elementary school children could be taught to interpret and draw maps, even as early as grade one (Blaut and Stea, 1971).

Later studies examined how the ability to interpret aerial photographs developed with age. It was shown that the greatest advance occurred between kindergarten (age 4-5) and grade two (age 6-7). Beyond grade two there was little improvement and even a slight decline in ability. This finding was significant because previous learning theorists had determined that the ability to interpret aerial photographs was not developed before the age of nine (grade 4) (Blaut and Stea, 1971; Stea and Blaut, 1973).

This research suggested that maps based on aerial photos, which presented key features in a simple concrete fashion, should be readily understood by elementary school children. The base map for the mapping exercise was therefore prepared by tracing the two study neighborhoods from an aerial photograph. Neighborhood features were simplified on the map, but included roads, buildings, lot lines, and the walkway network.

6.2.2 Setting Up and Administering the Mapping Survey

All three elementary schools in the study area were invited to participate in the mapping survey. The principals from the two schools in Thorncliff accepted, but the principal frcm the school in Aldergrove was not willing to give up any school time for the project. Given the results from Chapter 5, whereby the spatial patterns of use were influenced by differences in walkway layout between the two neighborhoods, the omission of Aldergrove was unfortunate, but it was nonetheless decided to persist with the Thorncliff part of the study.

The mapping survey was conducted among the children attending the two Thorncliff schools: Thorncliff Community School and St. Justin Elementary School. It was administered to St. Justin students in November 1988 and to Thorncliff students in January 1989. One class from each grade was chosen by the respective principals to participate in the study. Class size at Thorncliff School ranged from 19 to 26 students; at St. Justin School, it ranged from 23 to 26 students. In total, 284 students participated, about one-half of the total elementary school population in Thorncliff.

Base maps of the neighborhood were prepared in advance from aerial photographs to help the students draw their routes to school as accurately as possible, and to make the final maps easier to analyze. Six of my fellow graduate students administered the exercise so that the children would be anonymous to me, and no particular map could be associated with an individual child's route to school. Although the children were told not to put their names or addresses on the maps, many of them did so anyway. For the children's protection, all the maps were destroyed when the research was completed.

The following method was used to administer the survey. First, a map of the entire neighborhood (Appendix 3) was given to the children. At the same time, they were asked to look at the same map image on a screen at the front of the class. The graduate student who was administering the project explained what a 'map' was and what 'neighborhood' meant. This map was intended to orient the children to their neighborhood and help them relate where they lived to where they went to school. After this explanation, they were asked to locate and mark their homes on the map, and then think about how they travelled from home to school that day. If they did not know their address, or forgot it, the teachers were asked to help. Where required, the graduate students also helped the children locate and mark their homes on the map. Next, the children were each given a larger-scale map corresponding to the section of Thorncliff in which they lived (Appendix 3). Starting at their home, they were asked to draw the route they took to school that day. If they were driven or took the bus, they drew their route on the roads. Finally, they answered two questions about the way they got to school that day and why they took that particular route (Table 6.1). The questions and possible responses were either stated verbally or written on the blackboard. Children in grades 1 and 2 were helped individually. Care was taken not to influence their responses.

Table 6.1
Mapping project questions

1. How did you get to school today?
   a) I walked
   b) I was driven
   c) I rode my bicycle
   d) I took the bus
   e) I came another way (specify)

2. Why did you take that way to school?
   (can check more than one choice)
   a) My parents want me to go that way
   b) It's the shortest/fastest way
   c) I meet friends along the way
   d) It's safer to go that way
   e) My parents want me to take the bus/drive me
   f) I live outside Thorncliff
   h) I have another reason (specify)

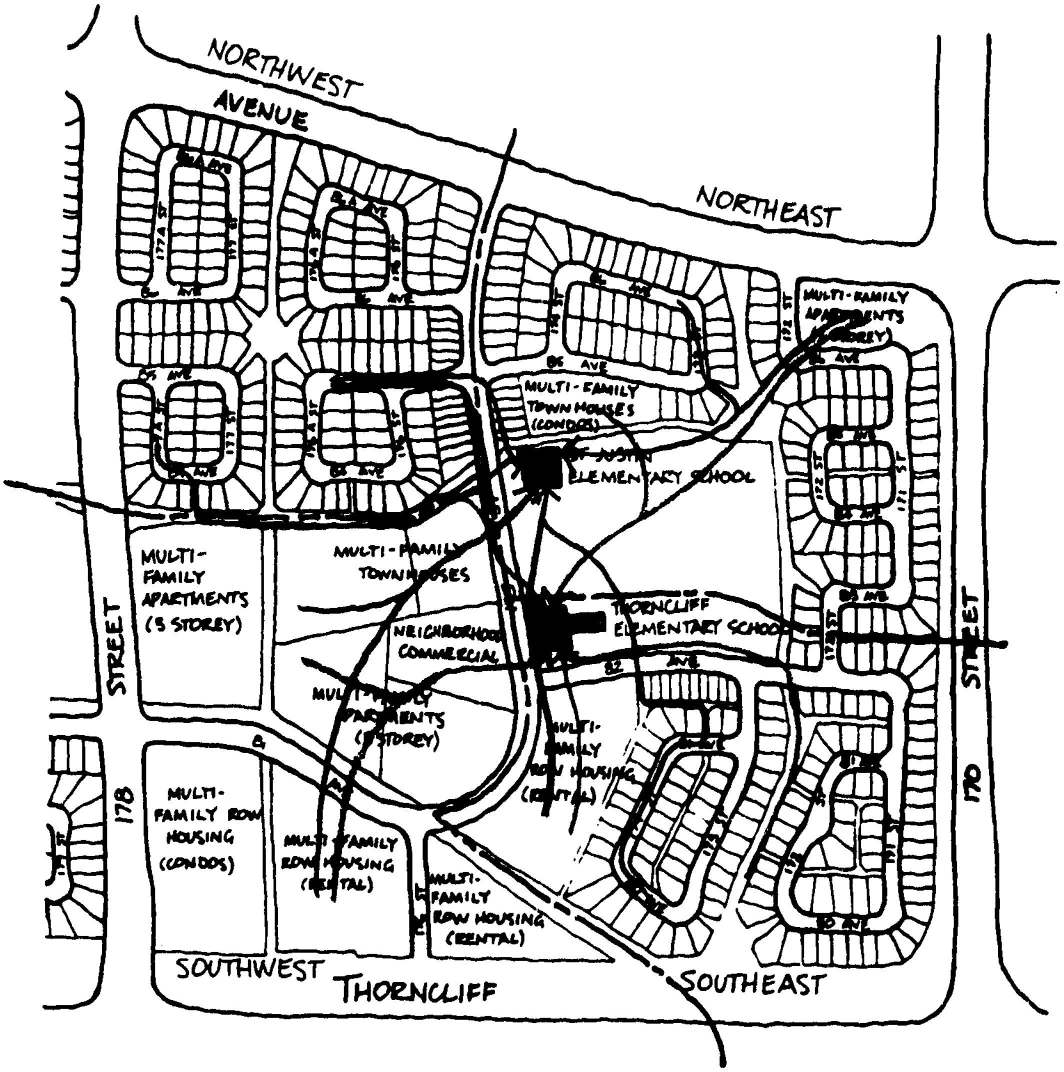
6.2.3 Analytical Method

The analyses were conducted only on the maps and responses from those children who stated that they walked to school on the day of the study, 201 in total (71% of the children from the 12 sampled grades). At Thorncliff Community School this comprised 112 of the surveyed children (82% of the children from the 6 sampled grades); at St. Justin School, however, only 89 respondents were included (60% of the children from the 6 sampled grades). Because St. Justin is a separate school, it draws students from surrounding neighborhoods as well as from Thorncliff. A lower proportion of children walked to St. Justin School simply because their homes were too far away. On the other hand, Thorncliff Community School is a public school, intended to serve the immediate neighborhood. As such, most of its students lived in the neighborhood and walked to school.

The first step in the analysis was to divide Thorncliff into four neighborhood sections, using major streets and parts of the walkways as boundaries (Figure 6.1). The convenience of the walkways was then evaluated using three sets of analyses. In the first, the general distribution of the surveyed children among the four neighborhood sections was described, and the distribution patterns were related to the form of the walkway network in each case. Second, the types of route patterns that emerged from the interpretation of all the children's maps were examined. The information from the children's maps was divided among four categories of routes. A 'Walkway' route was indicated where walkway use predominated; that meant that at least half of the travel distance had to be covered on walkways. Similarly, a 'Sidewalk' route was indicated by predominant use of the local street sidewalks. Next, 'Short Cut' was indicated by a variety of routes, including walking across parking lots or private property, using a sidewalk for a short distance, or crossing a walkway but never walking along one. It should be noted that the use of this term does not imply that the children always took the shortest possible route; often they did not. The 'Combination' route was made up of any combination of the three previous categories, the important factor being that no one type of route was dominant. Then these route patterns were examined in relation to walkway design and the distribution of the school children among the four neighborhood sections.

Third, the children's responses to Question 2, 'Why did you take that way to school?', were used to determine whether their choice of route was affected by how convenient or safe they felt the walkway network in Thorncliff to be. The responses, 'It's the shortest/fastest way' and 'It's my favorite/usual way to go' helped judge whether convenience was important to the children, while 'It's the safest way' and 'My parents want me to walk that way', were used to judge whether safety was a

Figure 6.1
Generalized routes to school from the
four neighborhood sections



KEY

— ROUTES TO THORNCLIFF ELEMENTARY SCHOOL
— ROUTES TO ST. JUSTIN ELEMENTARY SCHOOL

concern. It is important to know, however, that no distinction was made between safety from vehicular traffic and safety from personal attack in the wording of the question. I wanted the children's choice of response to be spontaneous, and I was afraid that by explaining what safety meant I would direct their choice, because they would have to think too much about it. The consequence, unfortunately, is that it is not clear whether the children made any distinction in their own minds.

6.3 DISTRIBUTION OF CHILDREN AMONG NEIGHBORHOOD SECTIONS

The largest concentration of children walking to both schools lived in the southwest section of Thorncliff (Table 6.2). Almost two-thirds of the surveyed children from Thorncliff School and over one-third from St. Justin School lived in this area. Housing in this section consists primarily of medium density multi-family rental units (Figure 6.1). All the surveyed school children lived in the rental units; none came from the condominium row-house project on 178 Street. Another 29% of Thorncliff School children and 21% of St. Justin children lived in the southeast section. As in the southwest section, most of them came from multi-family rental units. In total, then, 83% of the sampled children from Thorncliff School and 58% from St. Justin School lived in the southern half of Thorncliff. In contrast, only 6% of the Thorncliff School children and 17% of those from St. Justin lived in the northwest section, an area almost exclusively comprised of single-family detached homes on large lots. Single-family homes dominate the northeast section as well, but there are

Table 6.2
School children walking from each neighborhood section

	Thorncliff		St. Justin		Total	
Section	n	(%)	n	(%)	n	(%)
Northwest	7	(6)	15	(17)	22	(11)
Southwest	61	(54)	33	(37)	94	(47)
Northeast	12	(11)	22	(25)	34	(17)
Southeast	32	(29)	19	(21)	50	(25)
Total	112	(100)	89	(100)	201	(100)

also two multi-family projects there. Only 11% of the Thorncliff School children lived in this section, but 25% of St. Justin School children did, which was actually more than lived in the southeast section. Most of the children from both schools lived in the apartments at the northeast corner; a few also lived in the town-houses immediately north of St. Justin School.

The most important implication of this distribution pattern is the mismatch that it reveals between the design of the walkway network in each neighborhood section and the number of school children living in that seccion. The walkways in the northeast section of Thorncliff form the most comprehensive layout. They connect directly to almost all of the housing areas in the section and effectively channel pedestrian traffic towards the two elementary schools. The northwest section is also fairly well-designed, although its walkways do not channel pedestrian traffic as directly towards the schools as those in the northeast section do. More importantly, while the northern half of Thorncliff has the best walkway layout, it was home to only 28% of the children included in the survey, 11% in the northwest section and 17% in the northeast.

The walkways in the southeast section are almost as well-designed as those in the northeast. Like the two northern sections, most of the homes in this area are directly connected to the network, and the paths lead quite directly to the school complex. Unfortunately, however, they do not extend into the row-house development area on the west side of the section. Although a few of the units along its eastern margin are accessible from one path, none within it are. Since the majority of the school children from the southeast section lived in these row-houses, the walkways are not well placed to serve them.

In the southwest section, the walkways are poorly laid out in relation to the two elementary schools. The area is comprised almost entirely of multi-family rental units, yet the walkway network does not extend into the project sites, so individual units cannot be directly connected to it. Furthermore, the layout of the network does not channel pedestrian traffic toward the schools, or even to the local convenience commercial area at the center of the neighborhood. Unfortunately, the neighborhood section with the poorest walkway design affected the largest proportions of the surveyed children - 54% of the children from Thorncliff School, and 37% of those from St. Justin School.

6.4 MAPPED ROUTE PATTERNS

In analyzing the distribution of the children's mapped route patterns by neighborhood section, both proportional and absolute frequencies were included because of the low values in many of the cells in Tables 6.3 and 6.4. For example, only 7 of the surveyed children from Thorncliff Community School lived in the northwest section of the neighborhood. Dividing the 7 maps among the 4 route categories resulted in misleadingly high percentages of use. To obtain more meaningful results, it was decided that absolute values should be included as well. To assist in the interpretation, generalized route patterns are shown for each school from each neighborhood section (Figure 6.1) to illustrate how children most commonly walked to school. They are intended to provide a general picture of the preferred route patterns; they do not necessarily represent specific routes followed by individual children.

Overall, the route patterns for the sampled children differed between the two schools. At Thorncliff Community School, the majority of children took short cuts (49, or 44%), with combined routes a distant second. Walkways ranked no better than third at 16% (18 children). Among

Table 6.3
Thorncliff Community School
Walking route patterns

	Neighborhood sections									
	NW		SW		NE		SE		Total	
Walking route	n	(%)	n	(%)	n	(%)	n	(%)	n	(%)
Walkway	1	(14)	6	(10)	1	(8)	10	(31)	18	(16)
Sidewalk	3	(43)	10	(16)	1	(8)	2	(6)	16	14
Short cut	0	(0)	31	(51)	4	(33)	14	(44)	49	(44)
Combination	2	(29)	12	(20)	5	(42)	6	(19)	25	(22)
No Drawing	1	(14)	2	(3)	1	(8)	0	(0)	4	(4)
Total	7	(100)	61	(100)	12	(99)	32	(100)	112	(100)

Table 6.4
St. Justin Elementary School
Walking route patterns

	Neighborhood sections									
	NW		SW		NE		SE		Total	
Walking route	n	(%)	n	(%)	n	(%)	n	(%)	n	(%)
Walkway	8	(53)	9	(27)	5	(23)	4	(21)	26	(29)
Sidewalk	5	(33)	4	(12)	5	(23)	6	(32)	20	(22)
Short cut	0	(0)	10	(30)	5	(23)	2	(11)	17	(19)
Combination	5	(13)	8	(24)	6	(27)	7	(37)	23	(26)
No Drawing	0	(0)	2	(6)	1	(5)	0	(0)	3	(3)
Total	15	(99)	33	(99)	22	(101)	19	(100)	89	(99)

St. Justin children, by contrast, walkways were the dominant overall route at 29% (26 children), followed closely by combined routes, then sidewalks, and finally short cuts. The explanation can be seen quite clearly in Figure 6.1: St. Justin School has a better connection to the walkway network than the Thorncliff School does, and so is more conveniently located for walkway access.

By neighborhood section, walking routes again differed for the children from each school (Tables 6.3 and 6.4). In the northwest section, only 1 child from Thorncliff School chose a walkway route, whereas 8 of the 15 children attending St. Justin School did so. The main distinguishing feature of this section, of course, was that very few school children lived there. Although this made it difficult to specify a dominant use pattern for either school, in the case of St. Justin at least, it seems that walkway design actually facilitated walkway use to some extent.

In the northeast section, where only 12 children from the Thorncliff sample lived, combined routes (5) and short cuts (4) were roughly equal; together they accounted for 75% of actual use, whereas only 1 child chose a walkway route. The 22 St. Justin School children living in this area used all four routes fairly equally; the combined category was first (6, or 27%), followed by a tie (5 each, or 23%) among walkways, sidewalks, and short cuts. In this instance, the combined route category almost always included some use of the walkways, simply because this section has the most comprehensive walkway layout of the four, and so automatically becomes part of the children's routes to the schools. This is an indication of how a well-designed network, even if not used exclusively, can become an important part of whatever route is selected.

Among Thorncliff School children living in the southeast section, most took short cuts (14, or 44%) to get to school. Ten used a walkway route, followed by combined routes (6), and then sidewalks (2). In the case of St. Justin, combined routes (7, or 37%) and sidewalks (6, or 32%) were equally dominant. Walkway use was third (4 children) and only slightly greater than short cuts (2). Despite the fact that the network in this section is fairly well-designed, the level of walkway use by children from both schools was undoubtedly affected by the fact that most of them lived in the multi-family area that is not well connected to the walkway network. In particular, the proximity of the row-housing project to Thorncliff School immediately north reduced the potential for children from that school to use the walkways; it was more reasonable for them to take short cuts. Similarly, the only route choices for St. Justin children from the row-house area were the sidewalks along 175 Street or a combined route.

In the southwest section, short cuts dominated the children's routes to Thorncliff School (31, or 51%). Only 6 children used the walkways; it ranked last in this section, behind combined routes (12) and sidewalks (10). At St. Justin School, however, the children used short cuts (10, or 30%), walkways (9, or 27%), and combined routes (8, or 24%) fairly equally. This neighborhood section has the poorest walkway network design and the largest share of the children surveyed. The dominance of short cuts for Thorncliff children was reasonable because no walkway leads directly from the multi-family housing in this section to the school. For the St. Justin children, although one walkway leads to the school, it is not very convenient because it is at the edge of the site.

In summary, the analysis points to the conclusion that school children in Thorncliff used walkways only when it was convenient for them to do so; that is, when a section of walkway coincided with the most direct route that was available to them. This also suggests that other attributes of separated walkways, notably safety from traffic, are less important to children than convenience and directness. These conclusions will be tested further in the next section.

6.5 REASONS FOR CHOSEN ROUTE PATTERNS

When answering Question 2, 'Why did you take that way to school', the children were told they could choose more than one answer, resulting in a greater number of responses than children participating in the study. In total, there were 135 responses to this question from children at Thorncliff Community School, and 110 from those at St. Justin School As with the previous analysis, dividing them among the four neighbo od sections and the six response categories resulted in small numbers in some of the cells of the tables, and hence some misleadingly high percentages. Again, then, to make the results more meaningful, the analyses include absolute frequencies as well. In Tables 6.5 and 6.6, the measures of directness are marked *D and the measures of safety are marked *S.

Overall, the children who walked from both schools chose their mapped route because they felt it was the most direct way to go (Tables 6.5 and 6.6). The most obvious measure of directness, 'It's the shortest/fastest way', was the most popular choice of children from both Thorncliff School (48, or 36%) and St. Justin School (53, or 50%). For Thorncliff children, the other directness measure, 'It's my favorite/usual way to go', was a distant second (21%); the two measures of concern for safety, 'My parents want me to walk that way' and 'It's safer to go that way', ranked third and last (16% and 8% respectively). For St. Justin School children, all the other responses were much less popular than directness; although one of the safety measures was second (14%), the other safety measure tied fo last with the second directness measure (8% each).

When the two measures of directness were combined, it was clear that convenience was the prime concern to children from both schools - 76 (57%) from Thorncliff School and 64 (58%) from St. Justin School. Conversely, when the two safety measures were combined, safety was important to only 32 (24%) of the Thorncliff School children and 24 (22%) of those from St.

Justin. By neighborhood section, too, the surveyed children from both schools were more concerned about directness than safety. Children from every section felt their chosen route was the shortest/fastest way to school, with only one exception. Furthermore, in every case where this response was the first choice, it was far more popular than any other response; in combination with the other directness measure, it became even more prominent. In general, then, the children looked for convenience in their choice of routes to school, though some of them were willing to break this pattern to meet friends along the way. Most mapped routes that included this last response were quite circuitous; it seems that when walking to school with a friend, directness was no longer so important.

Table 6.5
Thorncliff Community School
Reasons for the chosen route

	Neighborhood Sections									
	NW		SW		NE		SE		Total	
Reason	n	(%)	n	(%)	n	(%)	n	(%)	n	(%)
*S My parents want me to walk that way	0	(0)	13	(18)	2	(14)	6	(15)	21	(16)
*D It's the shortest/ fastest way	2	(25)	25	(34)	6	(43)	15	(38)	48	(36)
I meet friends along the wayZ	1	(13)	10	(14)	1	(7)	5	(13)	17	(13)
*S It's safer to go that way	0	(0)	7	(9)	0	(0)	4	(10)	11	(8)
*D It's my favorite/ usual way to go	2	(25)	15	(20)	4	(29)	7	(18)	28	(21)
Other reason or No response	3	(38)	4	(5)	1	(7)	2	(5)	10	(7)
Total	8	(101)	74	(100)	14	(100)	39	(99)	135	(101)

Table 6.6
St. Justin Elementary School
Reasons for the chosen route

Reason	Neighborhood Sections NW n	(%)	SW n	(%)	NE n	(%)	SE n	(%)	Total n	(%)
*S My parents want me to walk that way	3	(15)	4	(11)	4	(14)	4	(17)	15	(14)
*D It's the shortest/ fastest way	9	(45)	22	(58)	15	(52)	9	(39)	55	(50)
Z I meet friends along the way	2	(10)	7	(18)	2	(7)	3	(13)	14	(13)
*S It's safer to go that way	2	(10)	1	(3)	3	(10)	3	(13)	9	(8)
*D It's my favorite/ usual way to go	2	(10)	2	(5)	3	(10)	2	(9)	9	(8)
Other reason or No response	2	(10)	2	(5)	2	(7)	2	(9)	8	(7)
Total	20	(100)	38	(100)	29	(100)	23	(100)	110	(100)

6.6 EVALUATION

On the basis of the evidence presented in th chapter, it has to be concluded that the walkway network in Thorncliff does not provide convenient access to either of the neighborhood's elementary schools. In the first place, the responses to question 2 in the survey established that the children in the study sample looked mostly for a direct route to school on the day of the survey, just as planning theory and the West Jasper Place plan expected they would. Yet only 44 of them (out of 201) chose routes dominated by walkways, and another 48 adopted combined routes which usually included a walkway for a short distance. In general, the surveyed children found other routes to be more convenient, so their relatively light use of the walkway network was a direct consequence of its layout.

This conclusion is substantiated by the detailed analyses of the children's route patterns by neighborhood section. As far as most of the children in the study sample were concerned, the existing walkways are inconveniently located; they do not provide direct links to the schools from where the children actually live. The situation may have been different at an earlier stage of Thorncliff's life cycle, when school-age children would have been living in most of the detached houses, but the walkways are not well connected to the rental housing projects where most of the students live today. Only when walkways could be incorporated into the most direct route to school, as in the northeast section of Thorncliff, did the children show much tendency to use them at all.

It also seems that safety was not a great concern in the children's choice of route, although this result is difficult to interpret since it is not clear what safety meant to them. On the one hand, it could indicate that the walkways were not seen as dangerous places, so fear of the walkways was not an explanation of their relatively low levels of use. On the other, it could indicate that Thorncliff's curvilinear street pattern was generally regarded as safe for pedestrians, so there was no strong incentive to seek alternative routes on the separated walkways. The children's own maps certainly made it plain that they did not go out of their way in order to be able to use a walkway.

On balance, then, the children looked for directness rather than safety in their choice of route to school. If the most direct route lay even partly along a walkway, then they would use it, but they showed no tendency to choose walkways in preference to more direct routes. This confirms the validity of the long-held planning principle that walkways must be direct if they are to function effectively for access purposes. Unfortunately, the Thorncliff network fails to meet this basic criterion with respect to the journey to school, despite the stated intentions of the West Jasper Place plan.

CHAPTER 7

CONCLUSIONS

7.1 INTRODUCTION

This chapter provides a synthesis of the results from the four analytical chapters in the context of the general thesis purpose, which was to evaluate the planned walkway networks of Thorncliff and Aldergrove. This is done in the first section, which briefly and directly answers the four research objectives. The second section then explains how different aspects of walkway layout influenced the actual use patterns that were observed. Finally, an overall evaluation is made of the walkway concept as it was applied in the two study neighborhoods.

7.2 ANSWERING THE FOUR RESEARCH OBJECTIVES

The first research objective was to determine exactly what policies the City of Edmonton has followed with respect to the planning of walkway networks in new residential areas, and how and why these policies changed over time.

The original intention of the walkways was to enhance the residential environment by improving convenience and safety for pedestrians. This was done by separating pedestrian and vehicular traffic so that pedestrians would have convenient and direct access to local service facilities and adjacent neighborhoods. The policy statements outlining these intentions were grounded in a larger body of planning theories and practices - neighborhood unit, Radburn concept, clustering, and suburban town theory - but in Edmonton the concept of comprehensive networks of separated walkways soon came to be seen as impractical. The reasons, however, were administrative and financial, and not because of concern about the functional value of walkway networks. All of the planners who were interviewed agreed that separated walkways are still desirable, despite the practical obstacles. In fact, there continues to be limited use of modified networks in some high-income residential areas in Edmonton.

The second research objective was to assess the levels of use of the walkways in Thorncliff and Aldergrove, and to compare the actual use patterns with the original policy objectives.

There were several policy objectives from the West Jasper Place plan with which the actual use patterns were compared. First, the walkways were particularly intended to provide access to local facilities for those people who were not likely to have a car - preschool and school-age children, housewives, and the elderly. The most important point about the findings in Chapter 4 is that the walkways had a broader appeal than the West Jasper Place plan suggested. For example, children made up the largest number of users at almost all times, not just when schools were open. Adult males and teenagers, too, made considerable use of the walkways, particularly in the evenings and on weekends. Adult females (housewives) were important users during the day-time period, but they also used the walkways in the evenings and on weekends. Only use by seniors, although about equal to their actual population distributions, was less than expected.

Second, the most frequent type of use for the study networks was expected to be walking. While this was supported by the results, it was observed that various other activities were popular as well. For example, while adults walked more than any other group, they also exercised their dogs and pushed infants in strollers. By far the most common activity after walking, however, was riding bicycles, especially among children. And what better place for children to ride their bicycles in relative safety than on these smooth, even paths removed from the roads? The final, relatively important type of use noted on the walkways was children playing; this is significant because the West Jasper Place plan had proposed that play lots should be built along the networks (Figure 3.3). In fact that was not done, yet the observations demonstrated that children like to play on the walkways, and do not just use them as a means of getting from one place to another. In short, the varied activity patterns were an important indication that the walkways had recreational value in their own right.

Third, levels of use were expected to be fairly evenly distributed throughout the day and the year, but weekday use should probably be greater than weekend use. In reality, only time of week use fulfilled this expectation; otherwise, use was most prevalent during summer and in the evening overall. This affected the fourth expectation from the plan, that the walkways would be used primarily for access. That is, the temporal variations provided further evidence that the walkways served an important recreational function, as indicated by the prevalence of use by all the age-groups (but especially adults and children) during summer holidays, in evenings generally, during fall evenings and weekends, and on winter weekends. All this use occurred at times when people were home from work or school, and available to use the walkways at their leisure. It seems that the West Jasper Place planners did not fully appreciate how the walkways would actually be used; nor did they realize that a recreational function would be such a highly positive feature for the neighborhood residents.

The third research objective was to assess the spatial patterns of use in Thorncliff and Aldergrove to evaluate whether convenient pedestrian access was being provided to service facilities.

While the walkway network in Aldergrove provided convenient access to neighborhood services, the network in Thorncliff did not. At the inter-neighborhood level, however, the walkways in both Aldergrove and Thorncliff seemed to function fairly effectively, as judged by the spatial patterns of use. In addition, because of the influence of the West Edmonton Mall site immediately north, Thorncliff's walkways became access corridors for pedestrian traffic moving from neighborhoods south of Whitemud Drive to West Edmonton Mall. These results show the practical difficulty of providing two levels of access, especially while attempting to incorporate existing site features such as pipeline rights-of-way into the plan.

The final research objective was to assess the use that elementary school children from Thorncliff and Aldergrove made of the walkways on their daily journeys to school. Since the children at the Aldergrove Elementary School were not permitted to participate in the survey, however, this objective was only partially realized.

As far as Thorncliff is concerned, the walkway network does not provide convenient access to either of the neighborhood's elementary schools. As a consequence, although the children in the study sample looked mostly for a direct route to school on the day of the survey, very few of them chose routes dominated by walkways. By and large, they found other routes to be more convenient. This occurred because the existing walkways are inconveniently located and do not provide direct links to the schools from where the children actually live.

7.3 THE INFLUENCE OF WALKWAY LAYOUT ON ACTUAL USE

The results from these analyses illustrate how walkway layout can have a profound effect on walkway use. Basic and straightforward policies in a plan can affect detailed walkway design, which in turn, can affect actual use patterns. Even though the same walkway planning principles were used for the entire West Jasper Place residential development area, individual neighborhood layouts were modified to accommodate existing site features and to provide distinct residential environments. For example, one policy from the plan was to utilize pipeline rights-of-way when laying out the pedestrian network. Although this is a simple and practical requirement, its application had implications on walkway use in the study area because it had a determining effect on walkway layout. As described in Chapter 5, that generally caused pedestrian traffic to be directed away from local service facilities; the consequences were particularly severe in Aldergrove, where the walkway along the pipeline right-of-way receives limited use, suggesting that it serves no useful purpose.

A second policy from the West Jasper Place plan, illustrated in Figure 3.1, was that the networks in each neighborhood were to be laid out so that they addressed two levels of access: to local service facilities (neighborhood), and to higher level service facilities (district). The practical difficulty of achieving both levels of access in all neighborhoods was shown in the results of Chapters 5 and 6. Although the physical layout of the walkways could accommodate both access levels, in the practical sense compromises invariably had to be made so that one level might unintentionally become more dominant than the other. For example, the walkways in Aldergrove were laid out so that pedestrian traffic was generally channeled toward the local service facilities, despite the fact that part of the network was built along an existing pipeline right-of-way. Then at the district level, the map of pedestrian traffic volumes provides an indication that people were moving between the two neighborhoods. As a result, both levels of access were addressed fairly effectively in Aldergrove; that is, the layout of the walkways in Aldergrove was generally supported by actual use.

In Thorncliff, however, this was not the case. At the local level, the walkway layout did not effectively channel pedestrian traffic to the service facilities. The mapping survey of the local school children (Chapter 6) indicated this very clearly. Although they did choose direct routes (as planning theory proposes), these routes were, by and large, not on the networks. The location of the pipeline right-of-way was partly to blame for this, because if anything, it angled pedestrian traffic away from the service facilities, and especially the school. At the district level, however, Thorncliff's walkways were much more effective. This was indicated by the fact that the highest levels of use (Figure 5.2) in Thorncliff were on two main corridors which extended from the pedestrian overpass at the south end to West Edmonton Mall immediately north of the neighborhood. The influence of this mall on walkway use in Thorncliff has been significant. These walkways have effectively become an access corridor for people living south of Whitemud Drive. As a result, although the layout of Thorncliff's walkways was also supported by actual use, it was at the district level rather than the local level.

Finally, the recreational aspect of the walkways must not be overlooked. As suggested by Chapter 4, despite the fact that the networks were intended for access purposes, there were times when the walkways were being used for recreation; in particular, during summer, on fall evenings and weekends, and on winter weekends. There were also certain activities which were very likely recreation-oriented. Some of the walking that was observed was recreational, especially when it involved two people with a baby stroller on a weekday evening, or children playing on the walkways, or people walking dogs. Besides walking, riding bicycles was also a popular activity on the walkways. Since the walkways extend from Thorncliff to neighborhoods south of Whitemud Drive, they provide excellent opportunities for cyclists to travel easily throughout West Jasper Place; they can also gain fairly quick access to West Edmonton Mall. As with walking, some of this activity was definitely recreation-oriented, particularly that of young males in the evening.

There are limitations to this interpretation, of course, arising from the 'complete observer' role that was chosen for the research. In particular, such key characteristics as flow patterns and recreational activity can only be inferred from the analyses of the observation data. To complement these data, the logical next step would be to conduct questionnaire surveys of sample populations of users and non-users. This would provide more detailed information about the ages of users, use by housewives, and where users came from (i.e. within or outside the neighborhood). More importantly, it would provide specific answers to the questions: "Why do you use (or not use) the walkways? For what purpose are you using them? Do you think they are a valuable component of the neighborhood environment?" The thesis plan could not include this kind of a survey because I had to keep the research within manageable limits. I consider this study an important first step, however, in understanding the use patterns on the walkways in these two neighborhoods.

7.3 CONCLUSIONS

Even though the final layout of the networks did not meet all the policies from the West Jasper Place plan, they are still valued and valuable features of Thorncliff and Aldergrove. That they are used a great deal is without question. That they are used by the people for which they were intended is debatable. The most important finding, however, was not whether the expected users actually used the walkways, but that actual use was much more broadly based than the planners had originally foreseen. Not only were children (male and female) the largest group of users at all times, this was true during both school hours and outside of school hours. Housewives not only used the walkways during the day-time, but also in the evening and on weekends. Other important users during evenings and weekends included male adults and male teenagers. Still, given the extent to which these walkways are used, debating who uses them does not really matter.

The types of activities that occurred on the walkways were really not an issue either. As expected, people did walk on them, but planners certainly did not foresee the popularity of riding bicycles. In fact, as above, the most important finding was in the diversity of the activities. Not only were the walkways used for walking, they were also ideal for riding bicycles because the inter-neighborhood connections allow them to be followed for quite long distances, something that people on foot would not generally do. Closer to home, children riding bicycles within the neighborhood were much safer from the dangers of road traffic when they stayed on the walkways. Other activities, even though much fewer in number, were still important because they added to this diversity of use - activities like exercising dogs, playing on a walkway, and pushing baby strollers.

The problem with local access in Thorncliff is also not that serious. Although the walkways did not provide direct and convenient access for the school children, they certainly were not concerned about it. Still, it is unfortunate that I could not include the school children from Aldergrove in the mapping exercise; the comparisons in walkway use between these groups would have provided better understanding of the effect of walkway layout on use by school children. At the higher level of access, the fact that Thorncliff's walkways were being used as pedestrian corridors to West Edmonton Mall illustrates the problem of reconciling the different layout responsibilities when providing for both levels of access. Perhaps this is just an unrealistic objective in walkway planning.

The biggest drawback to the walkways in both neighborhoods lies in the fact that they are not used consistently throughout the year. The greatest amount of use occurred during summer; it then declined somewhat in fall and very sharply in winter. Considering that Edmonton has fairly long winters, what must be reconciled is whether the great amount of summer use compensates for the minimal amount of winter use. Given the broad appeal of the walkways to different users and for different activities, however, this does not seem to be that important an issue. That is, in spite of the seasonality of use patterns, the walkways are valued by the people using them. It was obvious during the observation sessions that people enjoyed using the walkways and considered them a valuable part of their neighborhood.

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APPENDICES

APPENDIX 1

Interview Research Outline of Questions (Chapter 3)

The initial interview questions were sent to the subjects in late January. Although some of the specific questions were changed slightly before the interviews, their general direction remained the same. The following two sets of questions were sent for preview by the subjects:

1. Why did the walkway concept become popular in Edmonton during the late 1960s and early 1970s?
   - was a general policy introduced at that time encouraging the development of walkway systems in new subdivisions
   - who was involved in introducing it (i.e. public or private planners, developers, other public officials)
   - what were the reasons for introducing it
   - were you directly involved in its introduction and implementation, how and why
   - was general support for its use shown by the city, the community (Edmonton citizens), private and public planners, developers - or was it advocated only by a few important people
   - at that time, what was your opinion and perception of the new walkway concept

2. Why did support for the walkway networks decline during the 1970s such that it was no longer being used by the end of that decade?
   - were there certain local groups who were opposed to the concept (i.e. specific city departments, developers, private or public planners, citizen groups)
   - why did these groups oppose the walkway concept
   - were the walkway systems considered unsafe or dangerous by any of these groups, especially citizen groups
   - were studies conducted at that time to determine whether the concept was fulfilling its objectives from the outline plans
   - were studies conducted to determine if local residents were actually using the walkway systems, and whether they felt the walkways were an asset or a nuisance in their neighborhood
   - if so, what were the results of these studies
   - was support from certain key promoters of the concept declining (i.e. specific city departments, developers, private or public planners, citizen groups)
   - were there other variables changing during this time that might have affected support (i.e. economic conditions, local politics, subdivision design policy)
   - how were you involved with the planning and implementation of the walkway concept at this time
   - did your involvement change through the 1970s, how
   - when was the policy concerning use of the pedestrian

walkway system concept removed from subdivision design policy, and what was the reason given for its removal
-finally, what is the present policy regarding walkway systems in new residential subdivisions in Edmonton
-do you think it would be realistic to reintroduce the pedestrian walkway system concept today, why?

APPENDIX 2

Walkway Use Tables for Aldergrove and Thorncliff Based on Temporal Patterns, Users, and Activities (Chapter 4)

Unadjusted Frequencies of Use

Table 1
Walkway use by time of day

Time of Day	Aldergrove n	Thorncliff n	Total n
Morning	339	355	694
Afternoon	388	678	1066
Evening	747	804	1551
Total N	1474	1837	3311

Table 2
Walkway use by time of week

Time of Week	Aldergrove n	Thorncliff n	Total n
Weekday	976	1252	2228
Weekend	498	585	1083
Total N	1474	1837	3311

Table 3
Walkway use by season

Season	Aldergrove n	Thorncliff n	Total n
Summer	821	1007	1828
Fall	555	672	1227
Winter	98	158	256
Total N	1474	1837	3311

Table 4
Walkway use by age-group

Age-group	Aldergrove n	Thorncliff n	Total n
Child (0-12)	677	830	1507
Teen (13-19)	208	340	548
Adult (20-60)	568	606	1169
Senior (60+)	26	61	87
Total N	1474	1837	3311

Table 5
Walkway use by sex

Sex	Aldergrove n	Thorncliff n	Total n
Male	836	1121	1957
Female	638	716	1354
Total N	1474	1837	3311

Table 6
Selected observed activities of walkway users

Activity	Aldergrove n	Thorncliff n	Total n
*Walk	744	943	1687
Run or jog	20	8	28
*Bicycle	398	547	945
Skateboard	28	28	56
Wheelchair	7	1	8
Rollerskates	0	7	7
*Baby stroller	52	54	106
*Walk dog	123	77	200
Mow lawn	0	3	3
Bike seat	13	5	18
*Playing on walkway	77	140	217
Scooter	3	3	6
Wagon	2	1	3
Baby sled	0	10	10
Sitting	3	5	8
Vehicle	4	4	8
Walk cat	0	1	1
Total N	1474	1837	3311

Activities with an * were used in the analyses

Adjusted Use Patterns

Temporal Patterns

Table 7
Walkway use by time of day

Time of Day	Aldergrove % (n)	Thorncliff % (n)	Total % (n)
Morning	23 (339)	19 (355)	21 (694)
Afternoon	26 (388)	37 (678)	32 (1066)
Evening	51 (747)	44 (804)	47 (1551)
Total %	100	100	100
n	1474	1837	3311

Table 8
Walkway use by time of week

Time of Week	Aldergrove % (n)	Thorncliff % (n)	Total % (n)
Weekday	54 (586)	56 (751)	55 (1337)
Weekend	46 (498)	44 (585)	45 (1083)
Total %	100	100	100
Adjusted n	1084	1336	2420

Table 9
Walkway use by season

Season	Aldergrove % (n)	Thorncliff % (n)	Total % (n)
Summer	54 (547)	53 (671)	53 (1218)
Fall	36 (370)	35 (448)	36 (818)
Winter	10 (98)	12 (158)	11 (256)
Total %	100	100	100
Adjusted n	1015	1277	2292

Table 10
Time of day by season

Time of Day	Aldergrove % (n)			Thorncliff % (n)			Total % (n)		
	Summer	Fall	Winter	Summer	Fall	Winter	Summer	Fall	Winter
Morning	18 (99)	29 (107)	42 (41)	20 (134)	16 (72)	44 (70)	19 (233)	22 (179)	43 (111)
Afternoon	26 (142)	23 (85)	58 (57)	37 (249)	32 (143)	56 (88)	32 (391)	28 (228)	57 (145)
Evening	56 (307)	48 (177)	0 (0)	43 (289)	52 (233)	0 (0)	49 (596)	50 (410)	0 (0)
Total %	100	100	100	100	100	100	100	100	100
Adjusted n	548	369	98	672	448	158	1220	817	256

Table 11
Time of week by season

Time of Day	Aldergrove Summer % (n)	Aldergrove Fall	Aldergrove Winter	Thorncliff Summer % (n)	Thorncliff Fall	Thorncliff Winter	Total Summer % (n)	Total Fall	Total Winter
Weekday	51 (279)	51 (192)	41 (51)	61 (383)	45 (212)	41 (74)	56 (662)	48 (404)	41 (125)
Weekend	49 (269)	49 (182)	59 (74)	39 (247)	55 (261)	59 (105)	44 (516)	52 (443)	59 (179)
Total %	100	100	100	100	100	100	100	100	100
Adjusted n	548	374	125	630	473	179	1178	847	304

Table 12
Time of day by time of week

Time of Day	Aldergrove Weekday % (n)	Aldergrove Weekend	Thorncliff Weekday % (n)	Thorncliff Weekend	Total Weekday % (n)	Total Weekend
Morning	25 (146)	24 (120)	20 (151)	22 (129)	22 (297)	23 (249)
Afternoon	25 (146)	30 (149)	33 (248)	46 (269)	29 (394)	39 (418)
Evening	50 (293)	46 (229)	47 (353)	32 (187)	48 (646)	38 (416)
Total %	100	100	100	100	99	100
Adjusted n	585	498	752	585	1337	1083

Walkway users - age/sex characteristics

Table 13
Age-group by sex

Age	Aldergrove Male % (n)	Aldergrove Female % (n)	Thorncliff Male % (n)	Thorncliff Fema[illegible] [illegible] ([illegible]	Total Male % (n)	Total Female % (n)
Child	49	41	49	39	49	40
(0-12)	(413)	(264)	(551)	(279)	(964)	(543)
Teen	16	11	21	15	19	13
(13-19)	(135)	(73)	(231)	(109)	(366)	(182)
Adult	33	46	27	42	29	44
(20-60)	(272)	(291)	(302)	(304)	(574)	(595)
Senior	2	2	3	3	3	3
(60+)	(16)	(10)	(37)	(24)	(53)	(34)
Total %	100	100	100	100	100	100
n	836	638	1121	716	1957	1354

Walkway users - age-group by season

Table 14
Age-group by season

Age	Aldergrove Summer	Aldergrove Fall % (n)	Aldergrove Winter	Thorncliff Summer	Thorncliff Fall % (n)	Thorncliff Winter	Total Summer	Total Fall % (n)	Total Winter
Child	51	43	22	51	39	33	51	41	29
	(277)	(160)	(22)	(344)	(175)	(52)	(621)	(335)	(74)
Teen	13	15	17	18	21	15	16	18	16
	(72)	(55)	(17)	(118)	(93)	(23)	(190)	(148)	(40)
Adult	35	40	59	28	37	44	31	38	50
	(191)	(146)	(58)	(191)	(167)	(70)	(382)	(313)	(128)
Senior	1	2	1	3	3	8	2	3	5
	(8)	(9)	(1)	(19)	(13)	(13)	(27)	(22)	(14)
Total %	100	100	99	100	100	100	100	100	100
Adjusted n	548	370	98	672	448	158	1220	818	256

Table 15
Summer use by age-group and sex

Age	Aldergrove		Thorncliff		Total	
	Male	Female	Male	Female	Male	Female
	% (n)		% (n)		% (n)	
Child	55	45	55	45	55	45
	(169)	(107)	(221)	(123)	(390)	(230)
Teen	15	11	19	15	17	13
	(47)	(25)	(77)	(41)	(124)	(66)
Adult	28	43	23	36	25	40
	(88)	(103)	(91)	(99)	(179)	(202)
Senior	2	1	3	3	2	2
	(5)	(3)	(10)	(9)	(15)	(12)
Total %	100	100	100	99	100	100
Adjusted n	309	238	399	272	708	510

Table 16
Fall use by age-group and sex

Age	Aldergrove		Thorncliff		Total	
	Male	Female	Male	Female	Male	Female
	% (n)		% (n)		% (n)	
Child	46	40	44	31	45	35
	(97)	(63)	(125)	(50)	(222)	(113)
Teen	18	11	22	18	20	15
	(37)	(18)	(64)	(29)	(101)	(47)
Adult	34	47	31	49	32	48
	(72)	(74)	(88)	(79)	(160)	(153)
Senior	2	3	3	2	3	2
	(5)	(4)	(9)	(4)	(14)	(8)
Total %	100	101	100	1[illegible]	100	100
Adjusted n	211	159	286	162	497	321

Table 17
Winter use by age-group and sex

Age	Aldergrove Male	Aldergrove Female	Thorncliff Male	Thorncliff Female	Total Male	Total Female
	% (n)		% (n)		% (n)	
Child	24	20	35	30	31	26
	(13)	(9)	(33)	(19)	(46)	(28)
Teen	15	20	21	5	19	11
	(8)	(9)	(20)	(3)	(28)	(12)
Adult	59	59	35	58	44	58
	(32)	(26)	(33)	(37)	(65)	(63)
Senior	2	0	9	8	6	5
	(1)	(0)	(8)	(5)	(9)	(5)
Total %	100	99	100	101	100	100
n	54	44	94	64	148	108

Walkway users - age-group by time of day

Table 18
Age-group by time of day

Age	Aldergrove Morn	Aldergrove Aft	Aldergrove Eve	Thorncliff Morn	Thorncliff Aft	Thorncliff Eve	Total Morn	Total Aft	Total Eve
		% (n)			% (n)			% (n)	
Child	52	37	48	41	43	49	46	41	48
	(175)	(143)	(359)	(147)	(290)	(393)	(322)	(433)	(752)
Teen	6	20	15	17	18	20	12	19	17
	(19)	(78)	(111)	(61)	(120)	(159)	(80)	(198)	(270)
Adult	41	41	35	37	37	28	39	38	31
	(140)	(159)	(264)	(133)	(249)	(224)	(273)	(408)	(488)
Senior	1	2	2	4	3	3	3	2	3
	(5)	(8)	(13)	(14)	(19)	(28)	(19)	(27)	(41)
Total %	100	100	100	99	101	100	100	100	99
n	339	388	747	355	678	804	694	1066	1551

Table 19
Morning use by age-group and sex

Age	Aldergrove Male	Aldergrove Female	Thorncliff Male	Thorncliff Female	Total Male	Total Female
	% (n)		% (n)		% (n)	
Child	60 (113)	41 (62)	45 (91)	37 (56)	52 (204)	39 (118)
Teen	5 (9)	6 (10)	22 (44)	11 (17)	14 (53)	9 (27)
Adult	33 (61)	52 (79)	29 (58)	49 (75)	31 (119)	50 (154)
Senior	2 (4)	1 (1)	4 (9)	3 (5)	3 (13)	2 (6)
Total %	100	100	100	100	100	100
n	187	152	202	153	389	305

Table 20
Afternoon use by age-group and sex

Age	Aldergrove Male	Aldergrove Female	Thorncliff Male	Thorncliff Female	Total Male	Total Female
	% (n)		% (n)		% (n)	
Child	43 (89)	30 (54)	47 (194)	37 (96)	45 (283)	34 (150)
Teen	20 (42)	20 (36)	20 (84)	14 (36)	20 (126)	16 (72)
Adult	34 (70)	49 (89)	31 (127)	47 (122)	32 (197)	48 (211)
Senior	2 (5)	2 (3)	3 (12)	3 (7)	3 (17)	2 (10)
Total %	99	101	100	101	100	100
n	206	182	417	261	623	443

Table 21
Evening use by age-group and sex

Age	Aldergrove Male	Aldergrove Female	Thorncliff Male	Thorncliff Female	Total Male	Total Female
	%		%		%	
Child	48	49	53	42	50	45
	(211)	(148)	(266)	(127)	(477)	(275)
Teen	19	9	21	19	20	14
	(84)	(27)	(103)	(56)	(187)	(83)
Adult	32	40	23	35	27	38
	(141)	(123)	(117)	(107)	(258)	(230)
Senior	2	2	3	4	2	3
	(7)	(6)	(16)	(12)	(23)	(18)
Total %	101	100	100	100	99	101
n	443	304	502	302	945	606

Walkway users - age-group by time of week

Table 22
Age-group by time of week

Age	Aldergrove Weekday	Aldergrove Weekend	Thorncliff Weekday	Thorncliff Weekend	Total Weekday	Total Weekend
	% (n)		% (n)		% (n)	
Child	47	43	47	41	47	42
	(277)	(215)	(355)	(238)	(632)	(453)
Teen	14	15	19	18	16	17
	(80)	(75)	(140)	(107)	(220)	(182)
Adult	37	40	31	38	34	38
	(220)	(197)	(231)	(221)	(451)	(418)
Senior	2	2	3	3	3	3
	(9)	(11)	(25)	(19)	(34)	(30)
Total %	100	100	100	100	100	100
Adjusted n	586	498	751	585	1337	1083

Table 23
Weekday use by age-group and sex

Age	Aldergrove Male	Aldergrove Female	Thorncliff Male	Thorncliff Female	Total Male	Total Female
	% (n)		% (n)		% (n)	
Child	53 (174)	41 (103)	52 (238)	40 (118)	52 (412)	40 (221)
Teen	16 (53)	10 (26)	20 (92)	16 (48)	18 (145)	13 (74)
Adult	30 (98)	48 (122)	25 (112)	40 (119)	27 (210)	44 (241)
Senior	2 (6)	1 (3)	3 (14)	4 (11)	3 (20)	3 (14)
Total %	101	100	100	100	100	100
Adjusted n	331	254	456	296	787	550

Table 24
Weekend use by age-group and sex

Age	Aldergrove Male	Aldergrove Female	Thorncliff Male	Thorncliff Female	Total Male	Total Female
	% (n)		% (n)		% (n)	
Child	43 (123)	43 (92)	43 (155)	37 (83)	43 (278)	40 (175)
Teen	16 (46)	14 (29)	21 (78)	13 (29)	19 (124)	13 (58)
Adult	38 (109)	41 (88)	32 (115)	47 (106)	35 (224)	44 (194)
Senior	2 (6)	2 (5)	4 (13)	3 (6)	3 (19)	3 (11)
Total %	99	100	100	100	100	100
n	284	214	361	224	645	438

Walkway users - sex by temporal indicators

Table 25
Sex by time of day

Sex	Aldergrove Morn	Aldergrove Aft	Aldergrove Eve	Thorncliff Morn	Thorncliff Aft	Thorncliff Eve	Total Morn	Total Aft	Total Eve
		% (n)			% (n)			% (n)	
Male	55	53	59	57	62	62	56	58	61
	(187)	(206)	(443)	(202)	(417)	(502)	(389)	(623)	(945)
Female	45	47	41	43	38	38	44	42	39
	(152)	(182)	(304)	(153)	(261)	(302)	(305)	(443)	(606)
Total %	100	100	100	100	100	100	100	100	100
n	339	388	747	355	678	804	694	1066	1551

Table 26
Sex by time of week

Sex	Aldergrove Weekday	Aldergrove Weekend	Thorncliff Weekday	Thorncliff Weekend	Total Weekday	Total Weekend
	% (n)		% (n)		% (n)	
Male	57	57	61	62	59	60
	(331)	(284)	(456)	(361)	(787)	(645)
Female	43	43	39	38	41	40
	(254)	(214)	(295)	(224)	(549)	(438)
Total %	100	100	100	100	100	100
Adjusted n	585	498	751	585	1336	1083

Table 27
Sex by season

Sex	Aldergrove Summer	Aldergrove Fall	Aldergrove Winter	Thorncliff Summer	Thorncliff Fall	Thorncliff Winter	Total Summer	Total Fall	Total Winter
		% (n)			% (n)			% (n)	
Male	57	57	55	59	64	59	58	61	58
	(310)	(211)	(54)	(399)	(286)	(94)	(709)	(497)	(148)
Female	43	43	45	41	36	41	42	39	42
	(237)	(158)	(44)	(273)	(162)	(64)	(510)	(320)	(108)
Total %	100	100	100	100	100	100	100	100	100
Adjusted n	547	369	98	672	448	158	1219	817	256

Walkway activity - age and sex characteristics

Table 28
Walkway activity by age-group

Activity % (n)	Aldergrove Child	Aldergrove Teen	Aldergrove Adult	Aldergrove Sr	Thorncliff Child	Thorncliff Teen	Thorncliff Adult	Thorncliff Sr	Total Ch	Total Tn	Total Ad	Total Sr
Walk	43	63	61	56	37	55	74	62	40	58	68	60
	(273)	(128)	(329)	(14)	(284)	(184)	(438)	(37)	(557)	(312)	(767)	(51)
Bicycle	40	34	14	24	42	38	15	17	41	36	14	19
	(251)	(68)	(73)	(6)	(324)	(127)	(86)	(10)	(575)	(195)	(159)	(16)
Play	12	1	1	0	17	2	1	0	14	2	1	0
	(73)	(1)	(3)	(0)	(129)	(8)	(3)	(0)	(202)	(9)	(6)	(0)
Walk dog	1	3	20	20	1	3	7	22	1	3	13	21
	(7)	(5)	(106)	(5)	(10)	(10)	(44)	(13)	(17)	(15)	(150)	(18)
Stroller	4	0	5	0	4	1	4	0	4	1	4	0
	(26)	(0)	(26)	(0)	(28)	(4)	(22)	(0)	(54)	(4)	(48)	(0)
Total %	100	101	101	100	101	99	101	101	100	100	100	100
n	630	202	537	25	775	333	593	60	1405	535	1130	85

Table 29
Walkway activity by sex

Activity % (n)	Aldergrove Male	Aldergrove Female	Thorncliff Male	Thorncliff Female	Total Male	Total Female
Walk	50	58	47	64	48	61
	(385)	(359)	(499)	(444)	(884)	(803)
Bicycle	35	21	39	19	37	20
	(268)	(130)	(416)	(131)	(684)	(261)
Play	5	6	9	7	7	6
	(39)	(38)	(95)	(45)	(134)	(83)
Walk Dog	8	10	4	5	6	7
	(63)	(60)	(40)	(37)	(103)	(97)
Stroller	2	5	2	5	2	5
	(18)	(34)	(19)	(35)	(37)	(69)
Total %	100	100	101	100	100	99
n	773	621	1069	692	1842	1313

Table 30
Female walkway activity by age-group

Activity	Aldergrove % (n)				Thorncliff % (n)				Total % (n)			
	Child	Teen	Adult	Sr	Child	Teen	Adult	Sr	Ch	Tn	Ad	Sr
Walk	50	67	62	78	52	67	74	61	51	67	68	66
	(127)	(49)	(176)	(7)	(136)	(72)	(222)	(14)	(263)	(121)	(398)	(21)
Bicycle	29	29	11	22	25	22	13	13	27	25	12	16
	(75)	(21)	(32)	(2)	(66)	(24)	(38)	(3)	(141)	(45)	(70)	(5)
Play	14	1	0	0	16	2	1	0	15	2	0	0
	(37)	(1)	(0)	(0)	(41)	(2)	(2)	(0)	(78)	(3)	(2)	(0)
Walk Dog	1	3	20	0	2	6	7	26	1	4	13	19
	(2)	(2)	(56)	(0)	(4)	(6)	(21)	(6)	(6)	(8)	(77)	(6)
Stroller	6	0	7	0	6	3	5	0	6	2	6	0
	(15)	(0)	(19)	(0)	(16)	(3)	(16)	(0)	(31)	(3)	(35)	(0)
Total %	100	100	100	100	101	100	100	100	100	100	99	101
n	256	73	283	9	263	107	299	23	519	180	582	32

Table 31
Male walkway activity by age-group

Activity	Aldergrove % (n)				Thorncliff % (n)				Total % (n)			
	Child	Teen	Adult	Sr	Child	Teen	Adult	Sr	Ch	Tn	Ad	Sr
Walk	39	61	60	44	29	50	73	62	33	54	67	57
	(146)	(79)	(153)	(7)	(148)	(112)	(216)	(23)	(294)	(191)	(369)	(30)
Bicycle	47	36	16	25	50	46	16	19	49	42	16	21
	(176)	(47)	(41)	(4)	(258)	(103)	(48)	(7)	(434)	(150)	(89)	(11)
Play	10	0	1	0	17	3	0	0	14	2	1	0
	(36)	(0)	(3)	(0)	(88)	(6)	(1)	(0)	(124)	(6)	(4)	(0)
Walk Dog	1	2	20	31	1	2	8	19	1	2	13	23
	(5)	(3)	(50)	(5)	(6)	(4)	(23)	(7)	(11)	(7)	(73)	(12)
Stroller	3	0	3	0	2	0	2	0	3	0	2	0
	(11)	(0)	(7)	(0)	(12)	(1)	(6)	(0)	(23)	(1)	(13)	(0)
Total %	100	99	100	100	99	101	99	100	100	100	99	101
n	374	129	254	16	512	226	294	37	886	355	548	53

Walkway activity - temporal indicators

Table 32
Walkway activity by season

Activity	Aldergrove			Thorncliff			Total		
	Summer	Fall	Winter	Summer	Fall	Winter	Summer	Fall	Winter
	% (n)			% (n)			% (n)		
Walk	47 (243)	58 (204)	76 (73)	47 (302)	60 (259)	69 (100)	47 (545)	59 (463)	72 (173)
Bicycle	38 (194)	20 (69)	3 (3)	40 (257)	25 (106)	1 (2)	39 (451)	22 (175)	2 (5)
Playing	4 (23)	7 (25)	6 (6)	7 (43)	8 (34)	17 (25)	6 (66)	8 (59)	13 (31)
Walk Dog	7 (35)	11 (38)	15 (14)	4 (23)	4 (17)	12 (18)	5 (58)	7 (55)	13 (32)
Stroller	4 (18)	5 (17)	0 (0)	3 (20)	4 (16)	0 (0)	3 (38)	4 (33)	0 (0)
Total %	100	101	100	101	101	99	100	100	100
Adjusted n	513	353	96	645	432	145	1158	785	241

Table 33
Walkway activity by time of week

Activity	Aldergrove		Thorncliff		Total	
	Weekday	Weekend	Weekday	Weekend	Weekday	Weekend
	% (n)		% (n)		% (n)	
Walk	56 (309)	49 (229)	51 (371)	58 (324)	53 (680)	54 (553)
Bicycle	27 (151)	31 (146)	33 (238)	27 (150)	31 (389)	29 (296)
Playing	5 (27)	7 (32)	9 (63)	6 (35)	7 (90)	6 (67)
Walk Dog	7 (41)	12 (55)	3 (23)	7 (38)	5 (64)	9 (93)
Stroller	5 (26)	2 (8)	4 (26)	2 (11)	4 (52)	2 (19)
Total %	100	101	100	100	100	100
Adjusted n	554	470	721	558	1275	1028

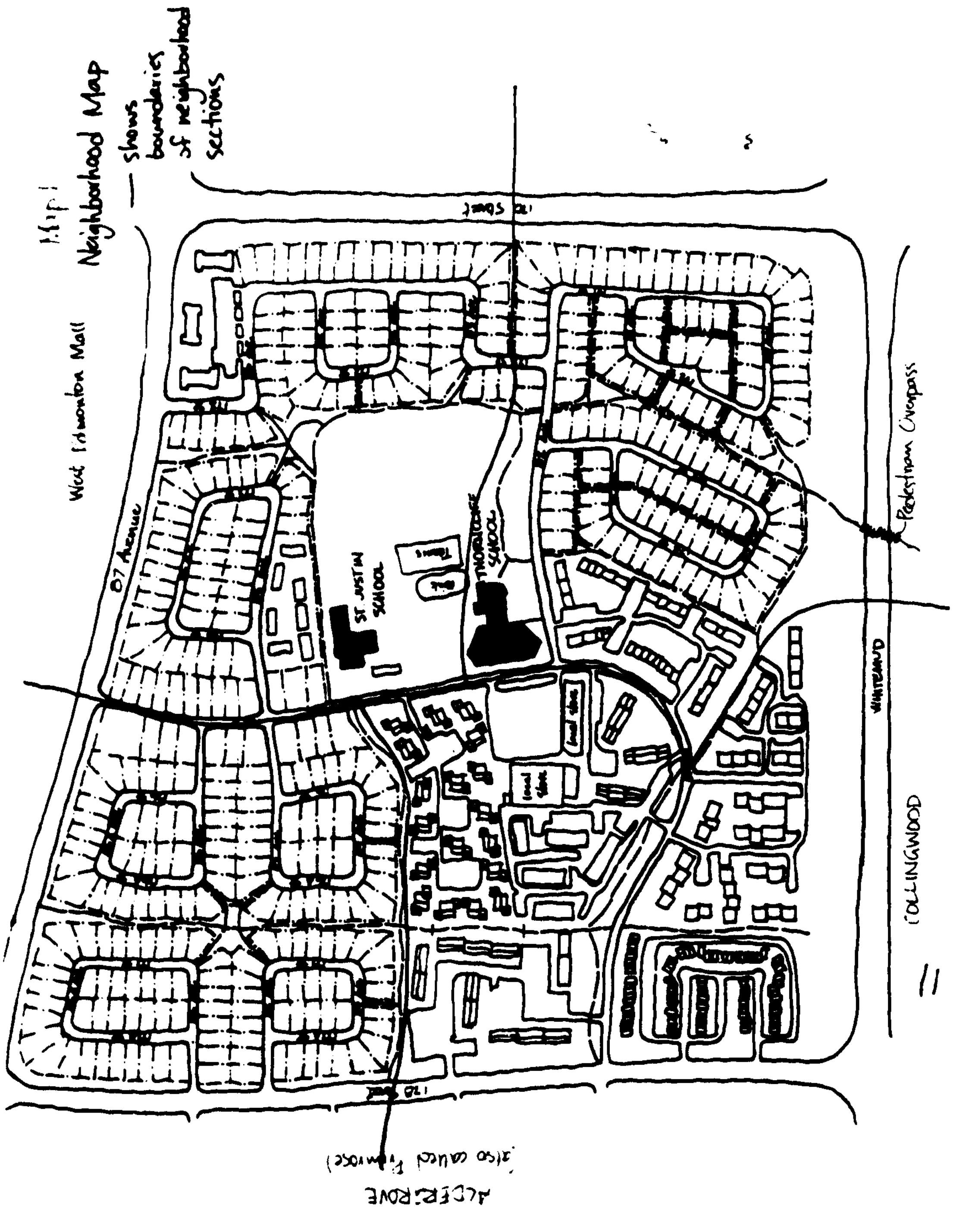
Table 34
Walkway activity by time of day

Activity	Aldergrove Morn	Aldergrove Aft	Aldergrove Eve	Thorncliff Morn	Thorncliff Aft	Thorncliff Eve	Total Morn	Total Aft	Total Eve
		% (n)			% (n)			% (n)	
Walk	56	62	48	57	56	50	57	58	49
	(185)	(222)	(337)	(192)	(370)	(381)	(377)	(592)	(718)
Bicycle	23	24	33	22	32	34	23	29	34
	(77)	(85)	(236)	(75)	(209)	(263)	(152)	(294)	(499)
Playing	2	2	9	11	4	10	6	3	10
	(5)	(6)	(66)	(37)	(26)	(77)	(42)	(32)	(143)
Walk Dog	12	10	7	5	4	5	9	6	5
	(40)	(37)	(46)	(18)	(24)	(35)	(58)	(61)	(81)
Stroller	7	2	3	5	4	2	6	3	2
	(22)	(8)	(22)	(15)	(26)	(13)	(37)	(34)	(35)
Total %	100	100	100	100	100	101	101	99	100
n	329	358	707	337	655	769	666	1013	1476

APPENDIX 3

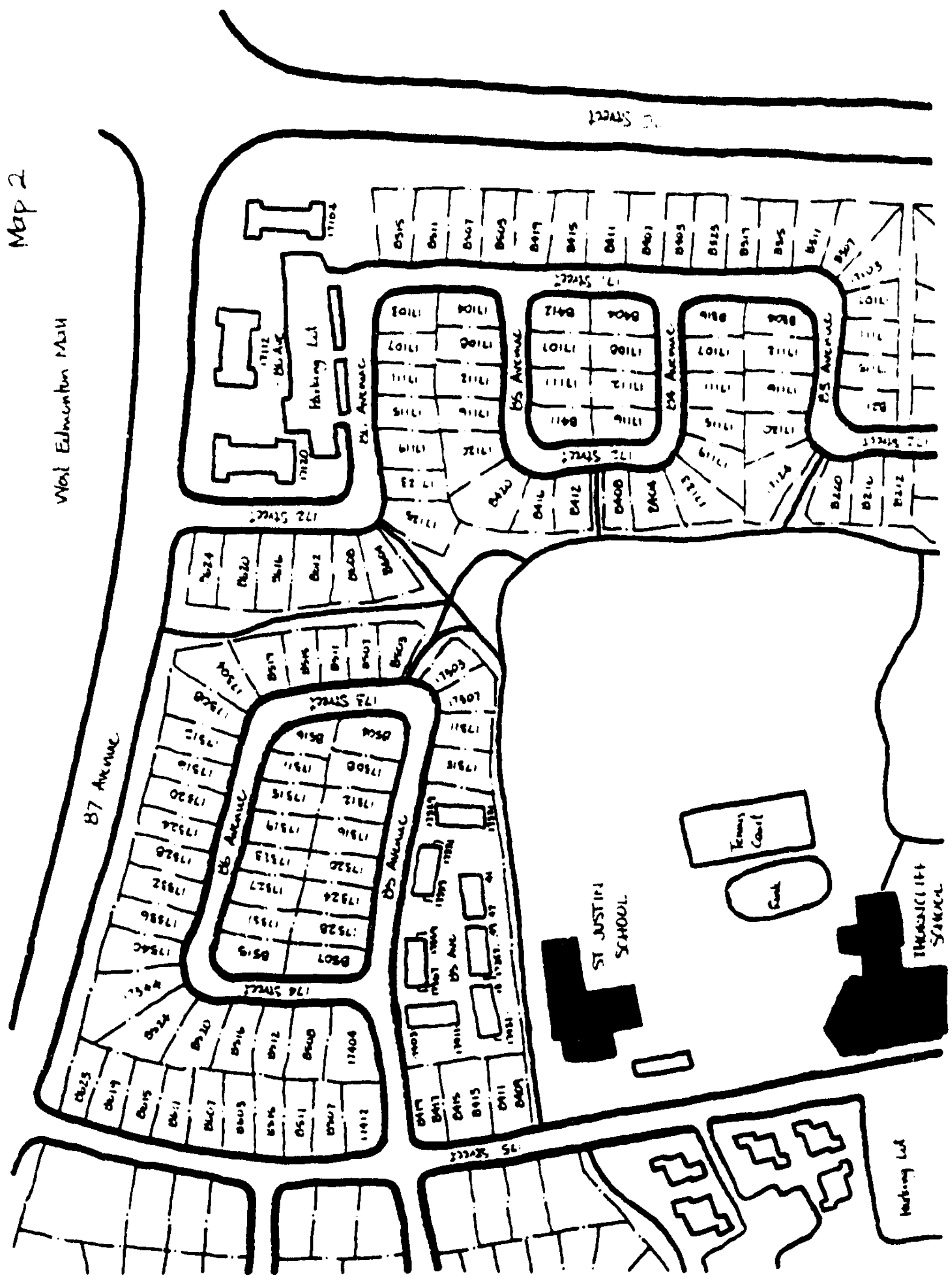
Map-Reading Exercise (Chapter 6)

Map 1 - Overall Neighborhood

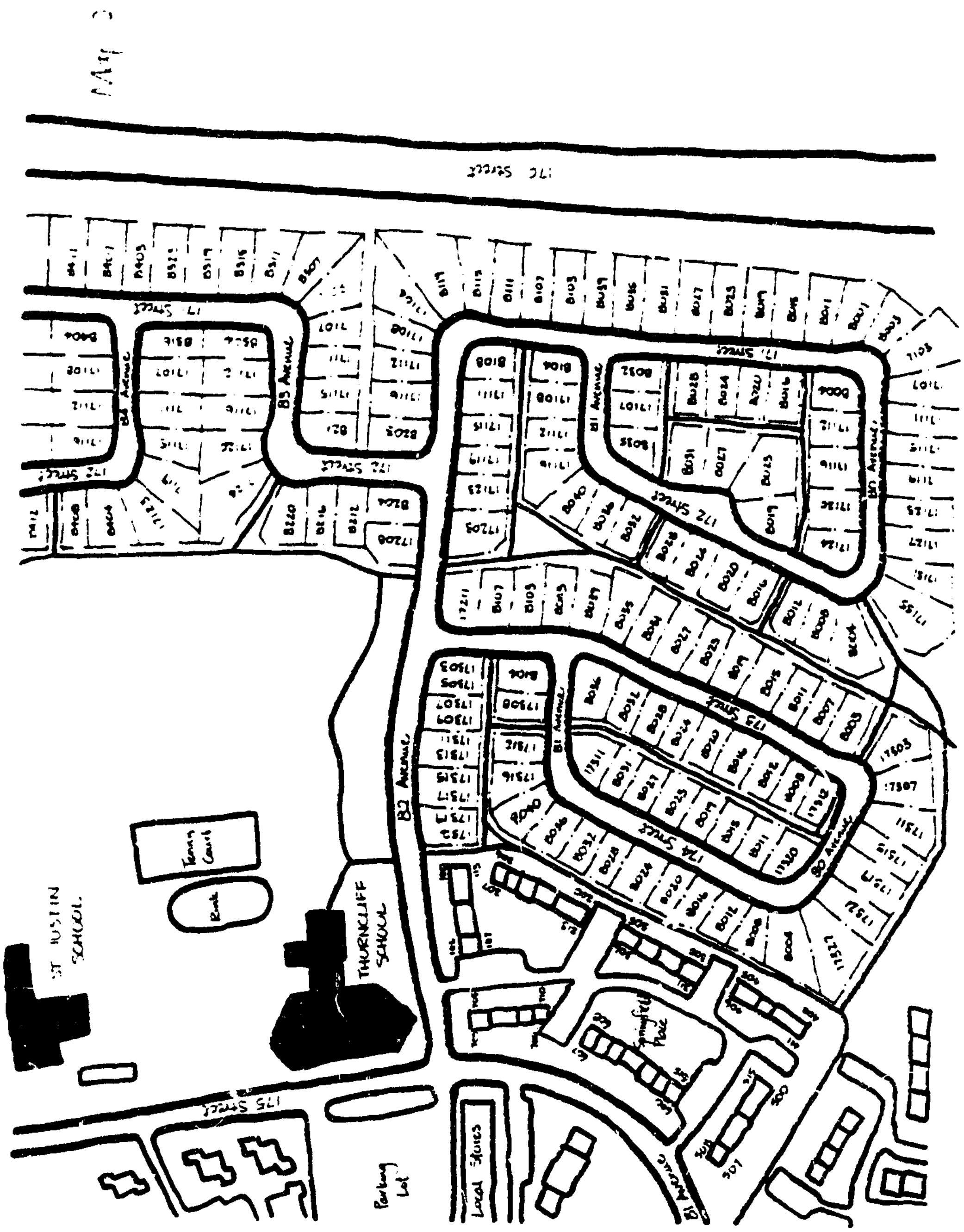


Map 2 - Four Neighborhood Sections

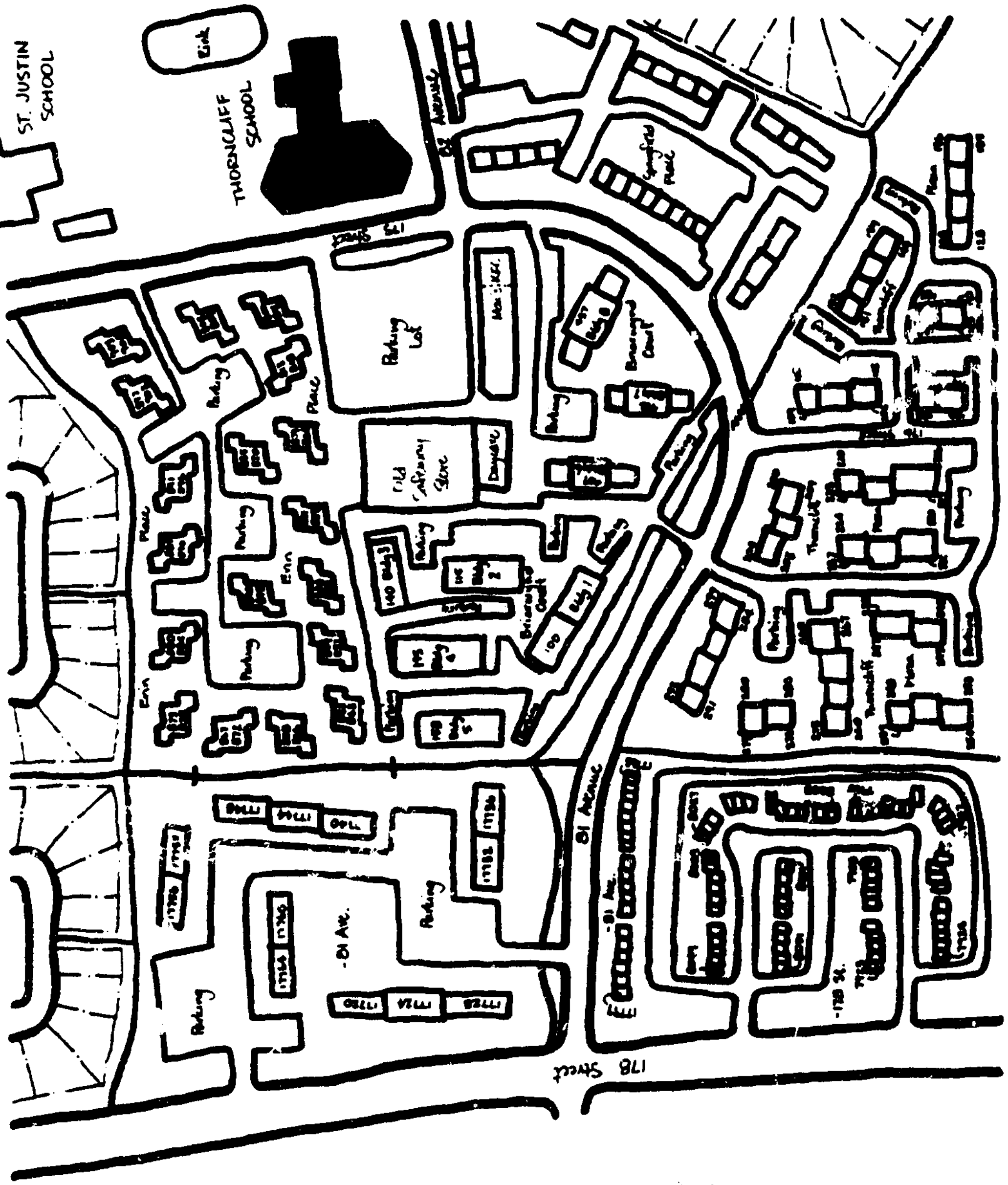
NE Section



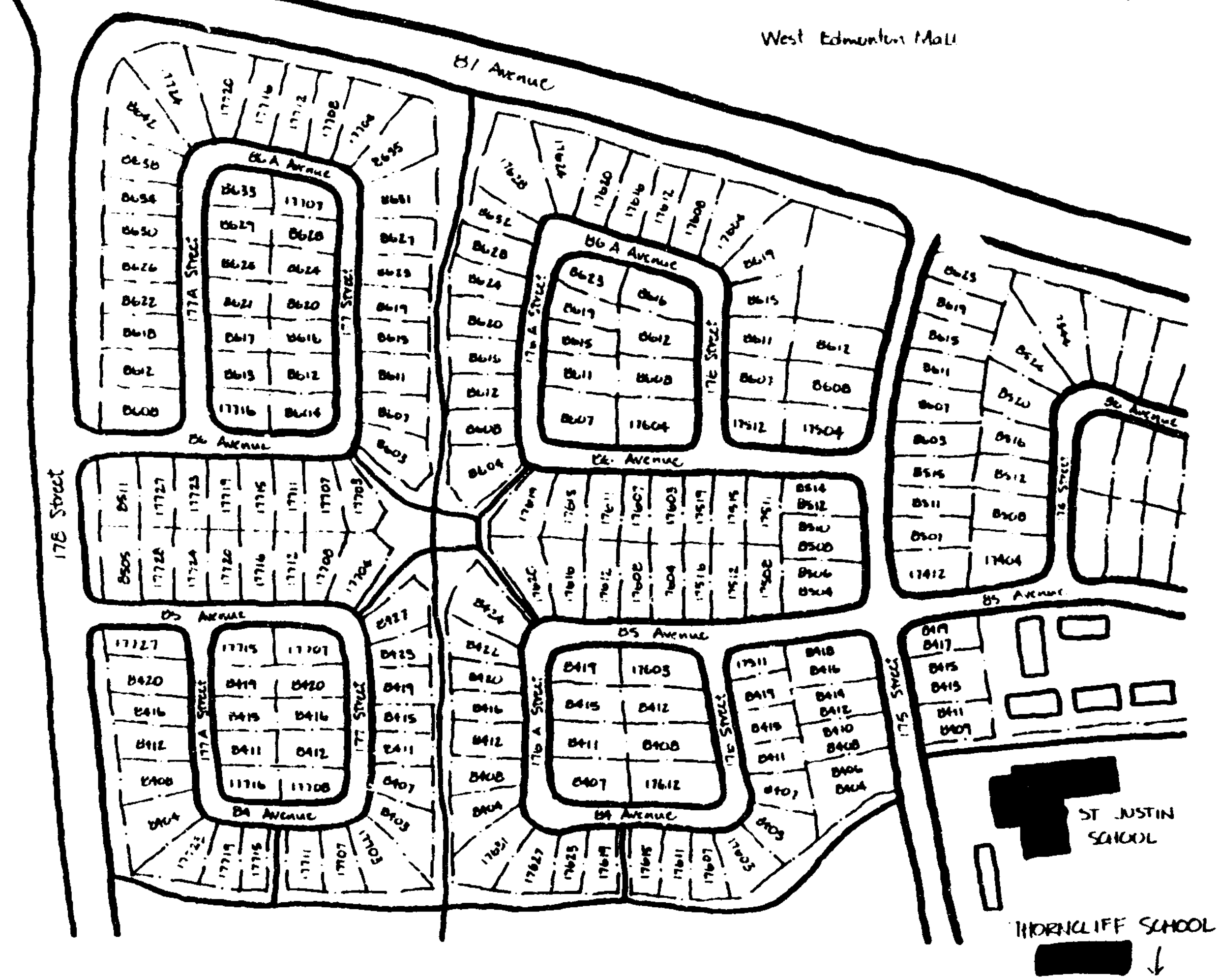
SE Section


ST JUSTIN SCHOOL
THORNCLIFF SCHOOL
Parking Lot
Local Stores

SW Section


ST. JUSTIN SCHOOL
THORNCLIFF SCHOOL
Rink
Parking Lot
Old Safeway Store
Daycare
Erin Place
Parking
81 Avenue
178 Street

Map 2


West Edmonton Mall
81 Avenue
178 Street
177A Street
177 Street
176 A Street
176 Street
175 Street
86 A Avenue
86 Avenue
85 Avenue
84 Avenue
ST JUSTIN SCHOOL
THORNCLIFF SCHOOL