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AN EVALUATION OF PATTERNS

A Study of the Out-of-House Patterns
of the Acadia Park Clusters
(University of British Columbia)

by

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ABSTRACT:

In his recent publications Christopher Alexander and his colleagues are mainly concerned with the description of what they call patterns. In 'A Pattern Language Which Generates Multi-Service Centers', these authors have stated that such patterns are tentative and based on much conjecture. They suggest that they need criticism and improvement. The authors further point out that these patterns do not establish an exact geometry of relationship to one another as they are studied and described in isolation. Thus the interrelationship between patterns and their geometry may vary from place to place. This thesis is an evaluation of such patterns, and therefore can be seen as an extension of the design method initiated by Christopher Alexander and the Center for Environmental Structure.

The author believes that when patterns (the component parts of which are pre-designed to prevent specific conflicting tendencies from occurring) are combined to form a cohesive whole, they may not fulfil the purpose for which they were initially designed.

The Acadia Park Clusters, the housing for married students at the University of British Columbia Campus was selected for the evaluation of patterns. The thesis looks at the out-of-house patterns of this project. Since this project was designed in the conventional architectural way and not according to the Pattern Language Method, an inventory of out-of-house patterns had at first to be abstracted from the design elements. The anticipated behavior of users relevant to these patterns was then posited. These positions became the hypotheses on which the created inventory of patterns was evaluated.

The author has gathered this data empirically by recording over a period of three weeks the activities of the participants and their characteristics in their natural settings.

The data shows that certain patterns fail to achieve their initial purpose when combined to form a cohesive whole. The study also points out that the physical arrangement of one pattern to another influences the intensity of use. It also suggests that when two patterns overlap, new tendencies develop.

This study confirms the importance of

evaluating patterns after they are combined to form a cohesive whole. It proves that this is necessary for their improvement and for the design of new patterns. If this sort of follow-up does not become a natural part of the design process, a communication breakdown between architect and user is bound to occur.

.....
Research Advisor

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C H A P T E R I

INTRODUCTION:

The basic requisite for any design problem is user needs. People's needs are changing with rapidly changing technology, economy and social conditions; and their needs are dependent on a variety of factors, namely, socio-economic status, life style, stage in the life cycle, personal values, etc.¹

The traditional relationship between an architect and his client in which both used to meet face to face to identify the user's needs and preferences and to discuss the design solutions, no longer occurs. In the case of housing projects, the potential users are mostly anonymous until the housing project is constructed and ready for occupancy. This lack of communication makes it rather difficult for the architects and the developers to gather information about the user's needs. In some instances the housing design process has employed one form or another of a public participation system to identify user's needs which has proved to be quite successful. As this author intends to use an observational technique to identify the user's needs, the public participation system will not be mentioned further.

In their paper, 'The Atoms of Environmental Structure', Christopher Alexander and Barry Poyner state that user needs have been defined by different expressions through different authors:

Christopher Jones calls them performance specification; Bruce Archer calls them design goals; in engineering they are often called design criteria; at the Building Research Station they are called user requirements; at the Ministry of Public Building and Works they have been called activities; they are often simply called requirements or needs. Whatever word is used, the main idea is always this: Before starting to design a building, the designer must define its purpose in detail. This detailed definition of purpose, goals, requirements, or needs can then be used as a checklist. A proposed design can be evaluated by checking it against the checklist.²

As stated previously, designers have employed the concept of user needs for designing facilities, but have failed to identify these needs in the case of housing projects, mainly due to the lack of direct contact with the potential user. The question then arises as to how the information about user needs is acquired. Alexander and Poyner defined user needs in the following operational terms:

We shall, in effect, accept something as a need if we can show that the people concerned, when given the opportunity, actively try to satisfy the need. This implies that every need, if valid, is an active force. We call this active force which underlies the need a 'tendency'. A tendency, therefore, is an operational version of a need. If someone says that a certain tendency exists, we can begin to test the statement.³

The example given was: 'People working in an office need a view'. This is a statement of need. When replaced by the statement, 'People working in offices try to get a view from the offices', this is a statement of fact which could be tested.⁴

In other words, every statement of a tendency is a hypothesis which could be tested empirically in order to rule out alternative hypotheses.

Since people's needs are defined operationally by active involvement in fulfilling their needs when they are given an opportunity, a need in this respect is an observable behavior of people. Since any complete description of the observed behavior of numbers of people is usually quantitative, it follows that a need is quantitative.⁵ For example, Alexander Kira's study of the bathroom reveals that while it is primarily designed for bodily functions, such as, washing and grooming, it also functions as a private telephone booth and as a refuge from family quarrels.⁶ No doubt this information pertaining to the bathroom not being designed as a telephone booth and yet being used as such is very valuable, however, until we know how often it functions as a telephone booth this information tells relatively little.

The studies of William Michelson,⁷ and

Alexander Kira⁸ indicate that user needs are dependent upon factors such as: cultural backgrounds, stage in the life cycle, family composition, personal values, socio-economic conditions, etc. Thus, in order to make the hypotheses about user needs more precise, the characteristics of the participants, the physical setting, and occupant behavior must be specified.

Christopher Alexander and his associates have developed a design method called 'Pattern Language' in which they have defined user needs in terms of user tendencies. They have applied this design method in the following projects:⁹

- a. A Pattern Language Which Generates Multi-Service Centers
- b. Houses Generated by Patterns
- c. Southwest Regional Laboratory for Educational Research and Development.

A similar design method was employed in designing the 'False Creek Proposals' by the False Creek study group.¹⁰

The sequence that Alexander and his associates follow in the design process is: First the identification of user tendencies and second the establishment of conflicts among these tendencies which eventually help to develop the patterns (design features). These

patterns, on the basis of their functional consequences, if synthesized, will determine the form of the building. (See Figure 1).

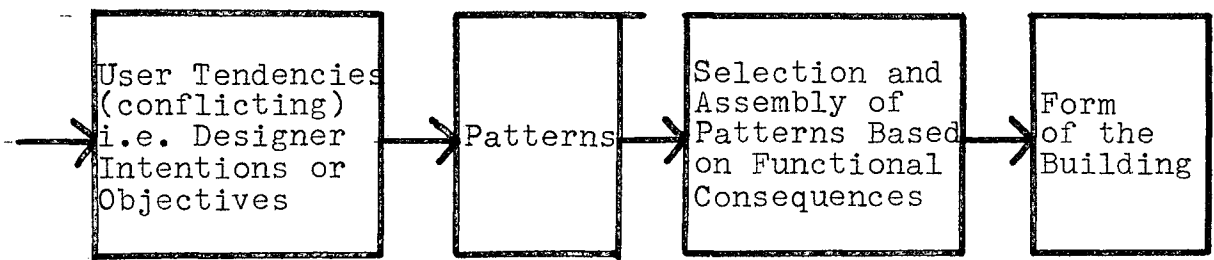


FIGURE 1 The Sequence of the Design Process Followed by Christopher Alexander and His Associates

The study conducted by Cooper and Hackett partially supports Alexander's model. They report that the designers follow similar sequences in the design process, that is, the designers first of all translate the objectives set by the sponsor into physical and non-physical terms and then they make assumptions about user's behavior on the basis of functional consequences of these design features.¹¹ (See Figure 2).

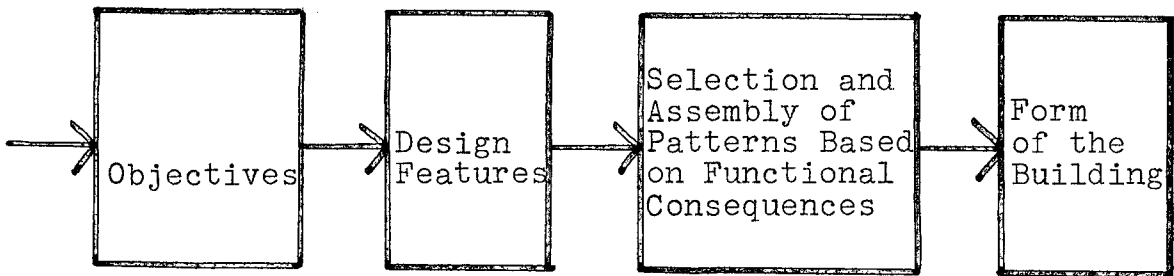


FIGURE 2 The Sequence of the Design Process
as Derived from the Study by
Cooper & Hackett

Michael Brill asserts,

. . . no architect I know of records his design assumptions ('if I shape the space this way, people will behave that way') and then goes back to the building a year after occupancy to ascertain whether or not his assumptions were correct. Worse yet, these untested assumptions are re-used again and again as part of the Architect's design repertoire. In other words, each building is a poorly planned 'experiment' whose 'hypotheses' are not explicitly stated, nor tested.¹²

The study of Cooper and Hackett supports Brill's assertion that the architects do not keep any records of the assumptions they have made about user's behavior.¹³

In 'A Pattern Language Which Generates Multi-Service Centers', Alexander, et al. have stated that the patterns are tentative and are based on much conjecture, and as well they need criticism and improvement. They have also mentioned that the patterns they are generating do not establish an exact geometry of relationship to one another. Thus the interrelationship between patterns and geometry may vary from building to building.¹⁴

The physical arrangement of various design features influences human behavior, as revealed in the studies of Festinger, et al.,¹⁵ Whyte,¹⁶ and Gans.¹⁷

Now, when patterns (the component parts of which are predesigned to prevent specific conflicting

tendencies from occurring) are combined to form a cohesive whole, there is therefore every reason to believe that new tendencies might develop. In order to be certain that the patterns are fulfilling the purpose for which they were initially designed as well as to be sure that no new tendencies have developed due to their physical arrangement, the patterns require evaluation after the occupancy of the potential user. The design method suggested by Alexander and his colleagues seems to ignore the evaluation aspect (shown by the dotted line - see Figure 3). If this is not included in the design process, a situation akin to communication breakdown occurs between architect and user.

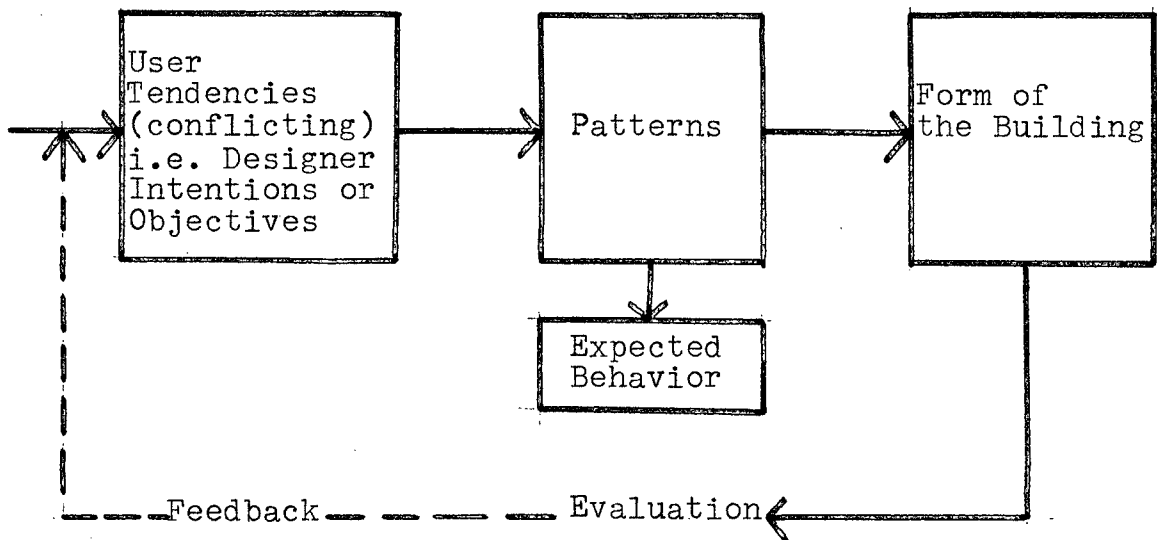


FIGURE 3 Ignored Phase of the Design Process as Indicated by the Dotted Line

Thus the present study is an extension of the design method of Christopher Alexander, et al., that is, an evaluation of patterns with a view to their improvement.

The approach of this study, as indicated in Figure 4, is applicable to situations in which a building is designed according to pattern language or otherwise.

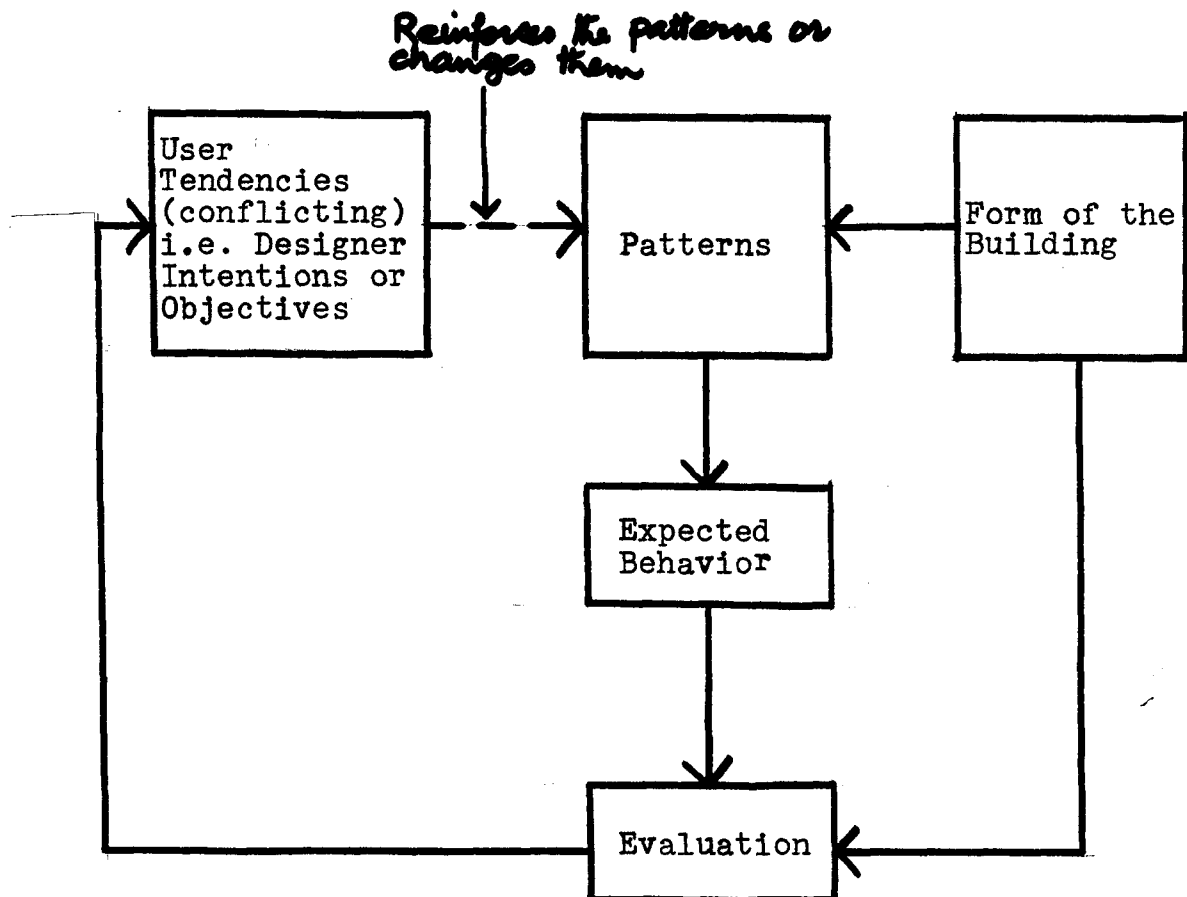


FIGURE 4 Approach of The Study

We know that under the pattern language method user needs are identified on the basis of research studies conducted before the patterns are designed; and these are testable hypotheses. As can be seen from the work of Cooper & Hackett, in cases where pattern language is not used, user needs are not operationally defined, and records of the assumptions about user behavior are not kept. This makes it very difficult to generate hypotheses about user needs.

In order to overcome the lack of records in projects which did not follow the pattern language method, an inventory of patterns must first be created. Then the anticipated behavior of users from previous research studies relevant to the created inventory of the patterns is studied. The anticipated behaviors will thus be the hypotheses which are tested and the evaluation of the results will either corroborate or provide new user tendencies which will reinforce the patterns or change them.

The study by Cooper and Hackett reveals that architects and landscape architects have emphasized the need for more research which could supply them with definite answers in such areas as:

. . . the background, ways of life, and needs of moderate-income families; the 'ideal' number of families around a court or interior common open space; the 'ideal' number of families using a

, common entrance or stairway; the ways in which people of different income groups use interior living space (i.e. whether they eat meals in kitchen, need a second bathroom, etc.); the range and nature of people's needs for privacy; auto-ownership rates; attitudes towards parking and its relationship to dwelling unit.¹⁸

In order to obtain relevant answers to the above cited questions, architects have established an informal 'feedback' from the residents so that in future projects of this kind they could formulate their design decisions on the basis of this data.

So far Christopher Alexander and his colleagues have concerned themselves with the description of patterns in isolation. They have not evaluated patterns after the occupancy of the potential user.

The author believes that when patterns are combined to form a cohesive whole, they may not fulfil the purpose for which they were initially designed. Thus the main purpose of the study is to evaluate patterns after they are combined to form a cohesive whole.

It has been stated previously that in order to make hypotheses about user needs precise, the characteristics of the participants, the physical setting and occupant behavior need to be specified. This study considers physical settings, occupant behavior in the physical settings; characteristics of participants are not considered other than age.

SELECTION OF SITE:

Owing to the unavailability of financial assistance, this study and all it involved rested solely on the author. This constraint compelled the author to restrict the boundary of the study and to consider that project which was readily accessible in order to accomplish it. Living in campus housing offered a unique opportunity to study the 'Acadia Park Clusters, Married Student Housing, University of British Columbia', built in 1966.

Generally the ever increasing rate of population growth makes it certain that many dwelling units will be constructed at an alarming rate in the future which calls for the immediate attention to the improvement of the design process. Realizing the problems involved in observing people's behavior within the units, the study is centered around people's out-of-house behavior, especially children whose behavior is least influenced even when they know they are being observed (as the study by Barker and Gump reveals¹⁹).

Thus the Acadia Park Clusters, Married Student Housing, University of British Columbia has been selected for the purpose of this study. Since the design elements of the Acadia Park Clusters were not designed according to the Pattern Language Method, an inventory of

the out-of-house patterns will be abstracted from the elements. These will be evaluated later in Chapter V. The expected behavior of users relevant to these patterns will then be studied. These expected behaviors will function as the hypotheses on which the created inventory of patterns will be evaluated.

The author believes that this study will assist the designers and housing administration in making their design decisions for 'Acadia, Stage II'.

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C H A P T E R I I

GEOGRAPHICAL SETTING:

Built in 1966, Acadia Park Clusters and Acadia Park Highrise were considered as low-cost housing projects to house undergraduate, graduate and Ph.D. married student families while the head of the family is studying at the University of British Columbia. It covers approximately twenty-seven acres of University of British Columbia Endowment Land, and has a density of approximately ten housing units per acre. This project is within ten minutes walking distance from the university and the shopping village.

The population of the Acadia Park Clusters could be called homogeneous in the sense that all residents are young parents and have children. The heads of nearly all the families are students, and the dwelling units of the families are basically of identical design. The majority of the families have low incomes, are transient, and are under great mental pressure. Ethnically, the population is equally distributed throughout the project.

A Survey conducted by Canadian Environmental Sciences in 1969 indicated that 80% of the population on

campus was North American. Sixty-one percent of all families had incomes less than \$5,000.00 (the median income of this sub-group was approximately \$3,500.00). Fifty percent of all wives worked full-time and about 10% part-time in order to assist the family. It was also indicated that the majority of the children were under five and very few children were above the age of nine years.

There are approximately 350 to 400 children and 325 to 350 adults within the Acadia Park Clusters.

In Acadia Park Clusters, there are 160 unfurnished (stove, refrigerator and curtains provided) two-bedroom suites and 15 three-bedroom suites at the rental rates of \$125 and \$140 per month respectively. The units are arranged in five clusters of two-storey houses. (See Figure 5). Although all the clusters are derived from a typical design, however, three of the five clusters are almost similar in size and form, whereas the remaining two differ. The housing units in each cluster (see Figure 5) are arranged around a common parking lot, and each has its own separate utility building equipped with automatic washers, dryers, clothes racks, ironing boards and laundry tubs. The automatic laundry units are operated by the Tenants Society which levies a fee on all tenants for the use of this equipment.

Beside the laundry area in the utility building is a garbage room in which a large central container for garbage is placed. (See Figure 5).

Fifteen 3-bedroom units are situated at corner locations within each cluster (see Figure 5) and are distributed as follows:

- 4 Units in Keremeos Court
- 1 Unit in Oyama Court
- 4 Units in Salmo Court
- 4 Units in Revelstoke Court
- 2 Units in Melfa Court.

All housing units have direct access to the ground floor. The living room and kitchen are on the ground floor, bedrooms and bathroom (bath, sink and toilet) and a small storage room are on the second floor. (See Figure 6). Clothes closets are built into the entry hall and into all bedrooms.

Of the five clusters' cul-de-sac parking lots, four are connected to the dead-end Osoyoos Crescent Street, whereas Melfa Court is connected to the dead-end Melfa Road. The dead-end streets are located on the periphery of the Acadia Clusters project which eventually connects the project to the main traffic arteries, Westbrook Crescent to the West and University Boulevard to the North.

Private sidewalks leading to each unit run off the public sidewalks which are around the perimeter of each parking lot. Public sidewalks connected to the parking lots by means of steps are situated eighteen inches higher than the parking lots.

The main service streets on the periphery of the site help to create a traffic-free internal pedestrian walkway running Northwest-Southeast, to which the public sidewalks of clusters are connected. In the center of the project and the pedestrian walkway are located the Kindergarten School and the Community Play Area. The Kindergarten School is operated by the Acadia Park Tenant Society and is for Acadia Park tenants only. The Community Play Area encompasses sandboxes, a large dry tree, a boat within one of the sandboxes, a rock pit, benches, a large asphalt area and swings adjacent to it. The community play area and the kindergarten school are surrounded by wooded areas on three sides.

Various, unsupervised, equipped play areas are scattered all over the project in the public open spaces.

Wooded areas of various sizes and shapes are situated along Osoyoos Crescent Street and also along the internal pedestrian walkway.

The Southeast and Southwest edges of the project are bounded by wooded areas, whereas on the Northeast and Northwest edges are located Acadia Park 14-storey highrise apartment building and older units (converted army huts) for married students with or without children. These units vary greatly in size and may contain one, two or three bedrooms. The Family Housing Section of the Department is located in the Highrise Tower of Acadia Park.

The study area has been indicated by a bold red line. (See Figure 7).

The following is a list of the various out-of-house design elements.

1. Clustering of Dwelling Units
2. Raised Sidewalk and Grass Around the Parking Area
3. Steps
4. Car Parking Area
5. Laundry Facility
- 6A. Entry Patio
- 6B. Patio Attached to the Living Room
7. Woods
8. Street
9. Public Walkway
10. Outdoor Play Area

11. Sandbox
12. Dry Tree
13. Rocks and Hillocks
14. Outdoor Seat
15. Community Play Area

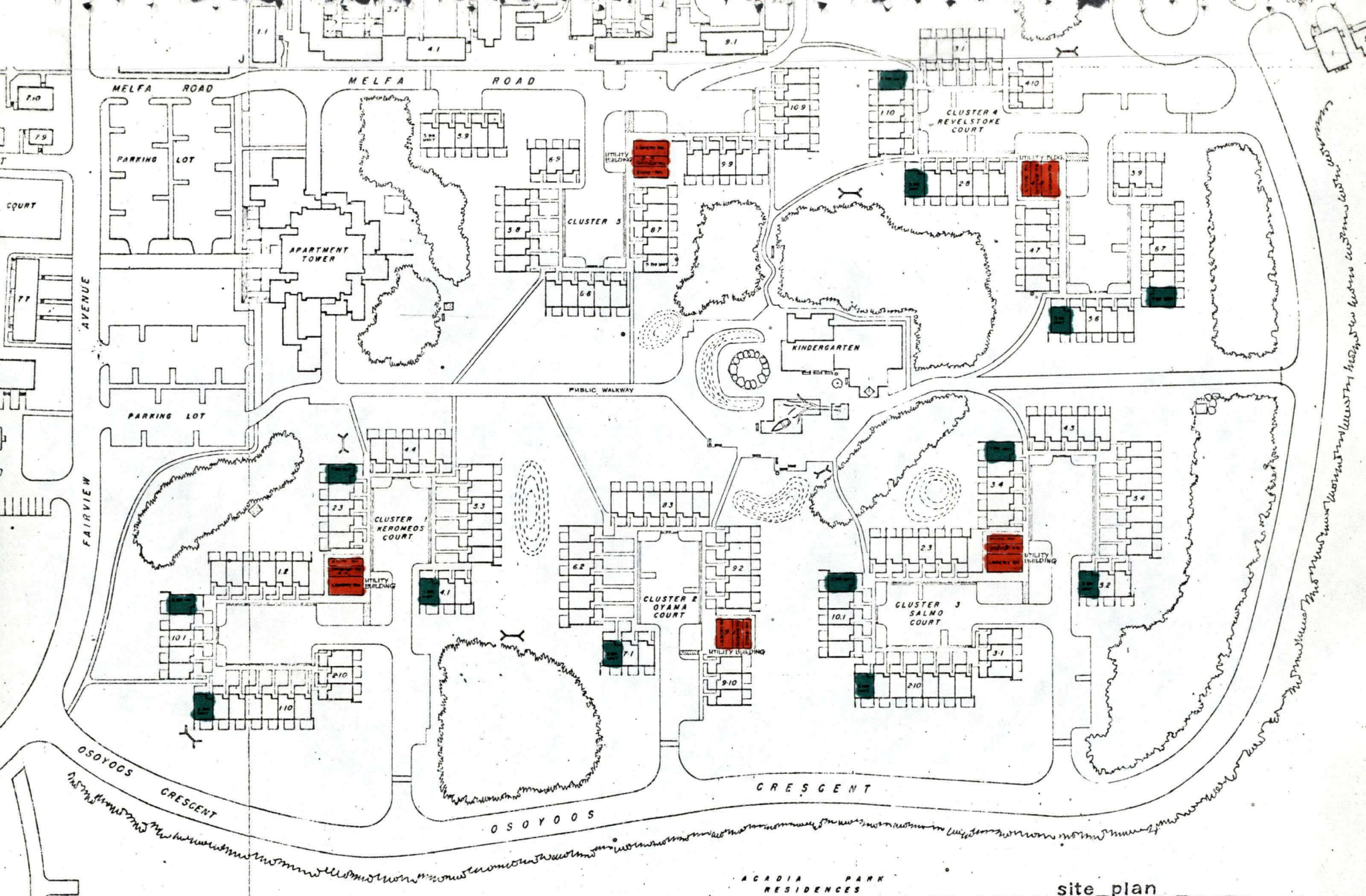


FIGURE 5 SITE PLAN OF THE ACADIA PARK CLUSTERS

- LOCATION OF UTILITY BUILDING
- LOCATION OF 3-BEDROOM UNIT

site plan

ACADIA PARK UBC

married graduate student residences

SCALE IN FEET

0 50 100 150 200

DIAGRAM 1

ACADIA PARK CLUSTERS
TYPICAL 2 BEDROOM APT.
MARRIED STUDENT HOUSING
SCALE: 1/16" = 1'-0"

NOV. 1971

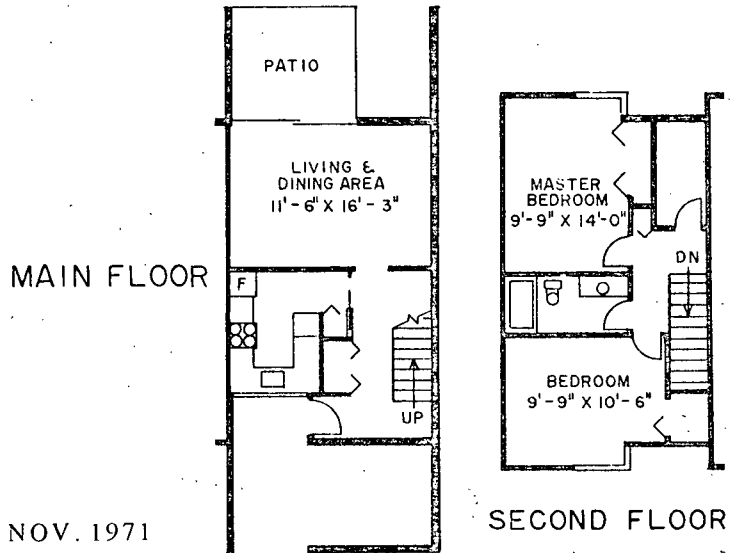


DIAGRAM 2

ACADIA PARK CLUSTERS
TYPICAL 3 BEDROOM APT.
MARRIED STUDENT HOUSING
SCALE: 1/16" = 1'-0"

NOV. 1971

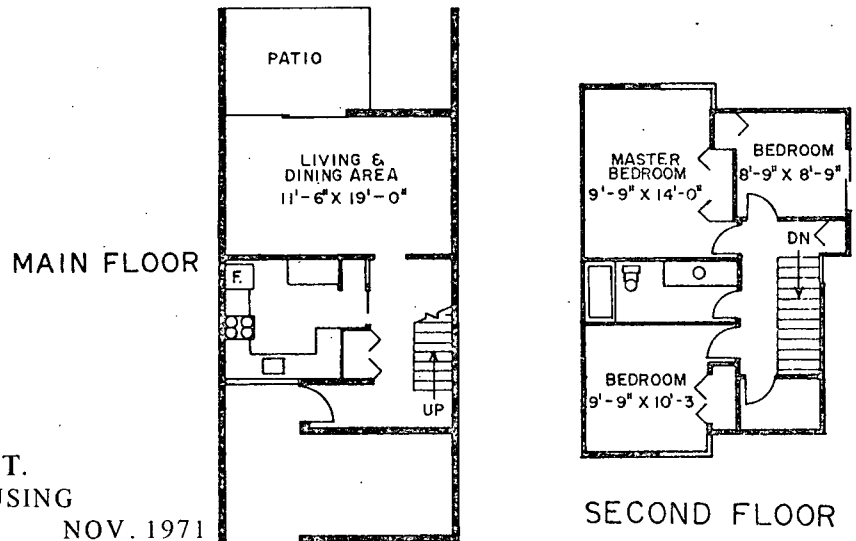


FIGURE 6 Floor Plans of Dwelling Units

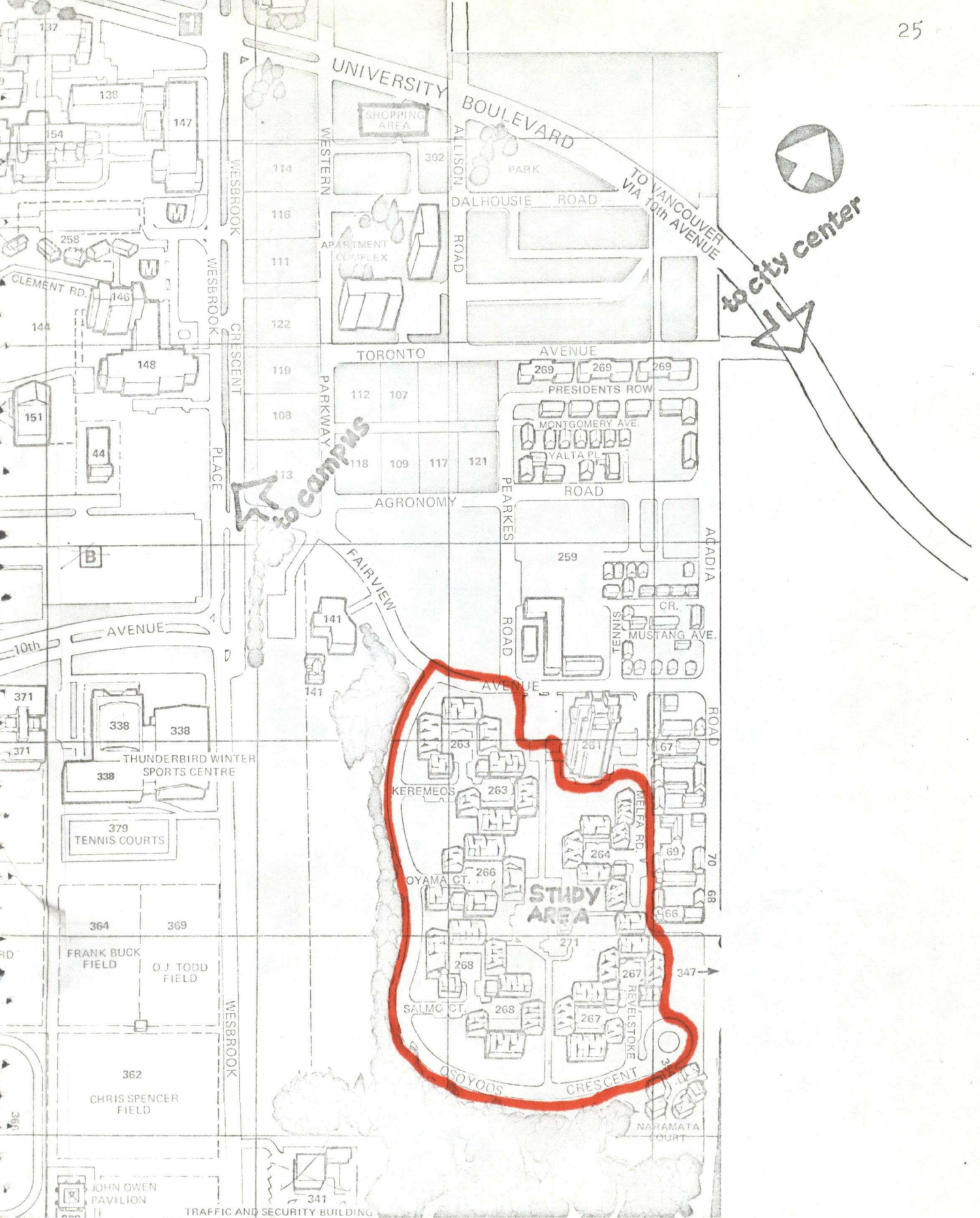


FIGURE 7 Map of the Study Area

C H A P T E R I I I

PATTERNS AND ANTICIPATED BEHAVIOR:

As has been indicated previously, the purpose of this study is to evaluate patterns in relation to their potential users, in order to develop a feedback system which would assist the designers, the administrators and the developers in making their design decisions.

A pattern is a three-dimensional pre-designed component encompassing a set of elements; and the geometrical arrangement of these elements helps to prevent conflict among people's tendencies. In other words, a pattern should be congenial to people's behavior. As the patterns (on the basis of their functional consequences) are assigned a specific location during the process of synthesis, it is considered vital to establish the location of each pattern in relation to the cohesive whole.

Since the 'Acadia Park Clusters, Married Student Housing Project, University of British Columbia' was not designed according to the Pattern Language, it became essential for the out-of-house patterns and their relevant expected behavior to be identified.

In order to create an inventory of the

Patterns and their descriptions, a walk around this area (Figure) was conducted during which all the patterns were observed and recorded. The expected behavior relevant to these patterns were recorded.

The following is a list of the Patterns and their anticipated behavior:

Design Element: CLUSTERING OF DWELLING UNITS



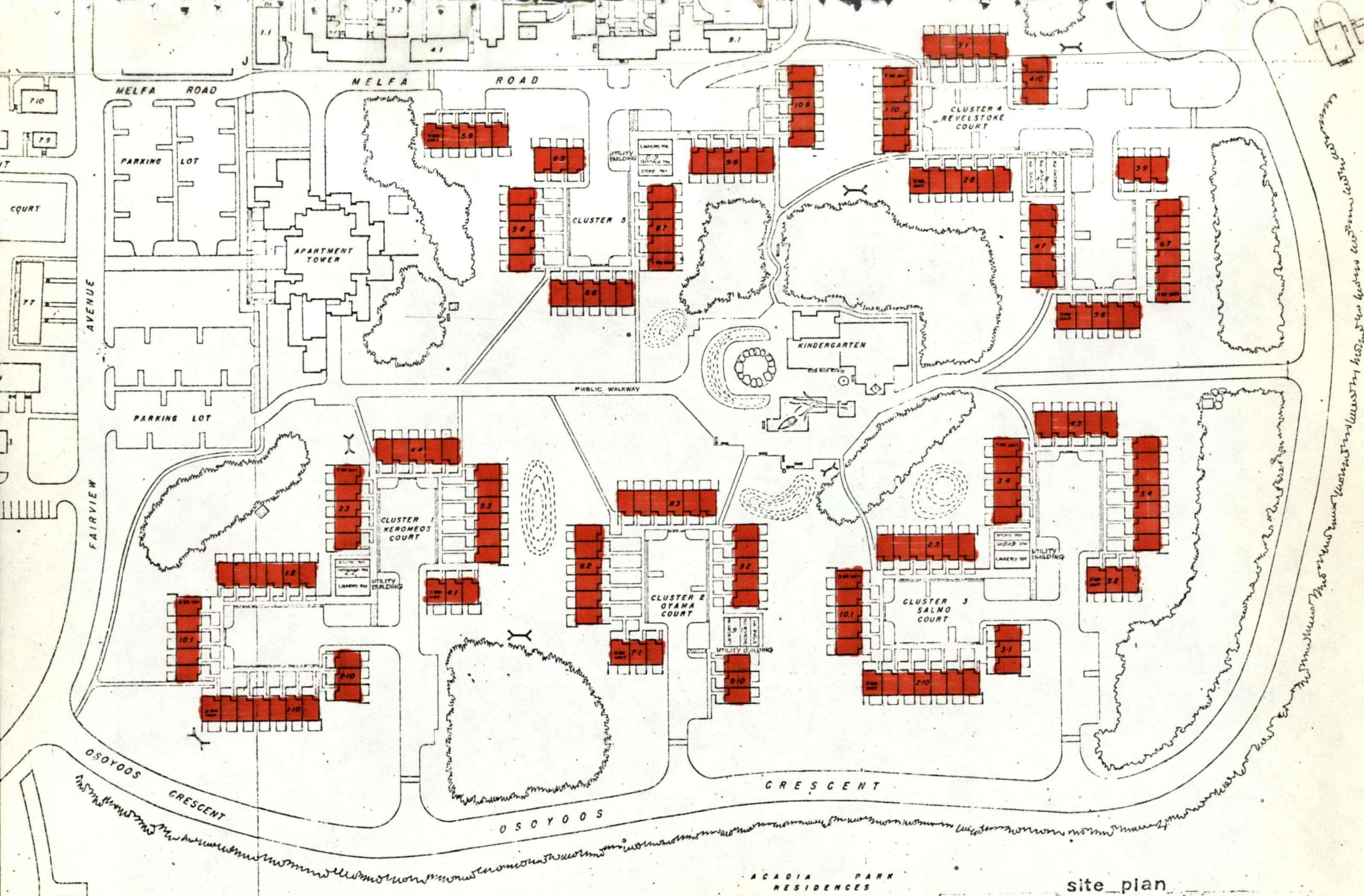


FIGURE 8 LOCATION OF CLUSTERS SHOWN IN COLOUR

site plan
ACADIA PARK UBC
married graduate student residences

SCALE IN FEET
0 50 100 150 200

1. DESIGN ELEMENT: Clustering of Dwelling Units

General Remark:

Alexander, et al. stated that 'the areas which people identify with are extremely small - of the order between 100 and 200 meters in diameter.'¹ The studies of Festinger, et al.,² Gans,³ Willmott,⁴ Whyte,⁵ and Cooper⁶ have shown that when people are grouped together, a primary social group develops beyond the family itself. Most of the visiting, socializing and mutual help takes place among the residents living close by.

PATTERN

In each cluster there are two-bedroom and three-bedroom suites which are clustered around five separate parking/service courts

ANTICIPATED BEHAVIOR

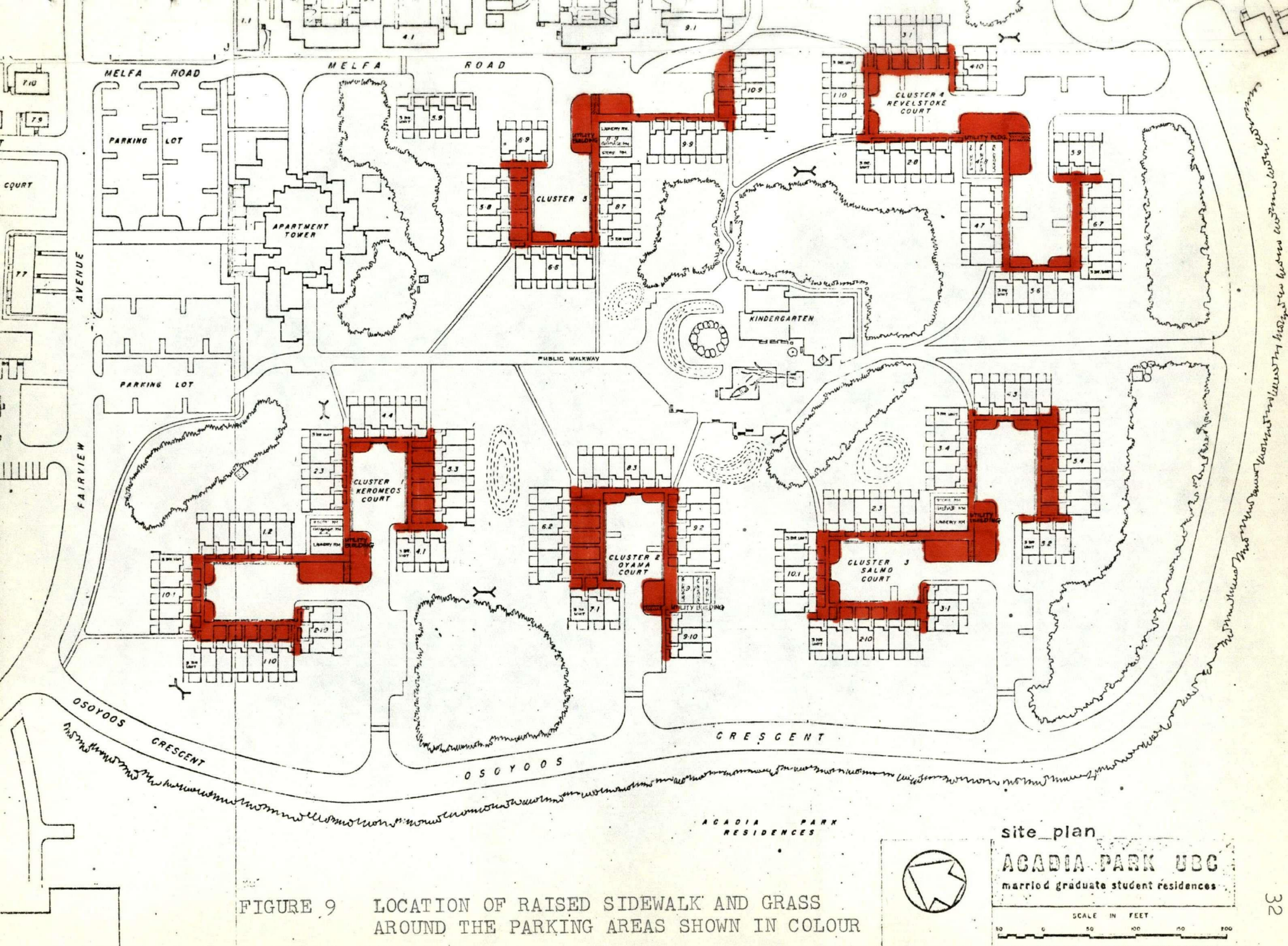
- a. Whyte's study suggests that when clusters vary in terms of types and number of dwellings around the parking lots, different patterns of public behavior result. The behavior of the family is affected by the cluster he joins.⁷ He also establishes that in rental courts formed around parking bays, social life is oriented inward.⁸

- b. The study of public housing projects done by Saile, et al. has revealed that dwelling courts arranged around parking/service facilities contain more activities than the planned play areas on the site.⁹

1. Alexander, Christopher, Hirshen, S., Ishikawa, S., Coffin, G., & Angel, S. Houses Generated by Patterns. Berkeley, California, Center for Environmental Structure, April 1970. pp. 56-59.
2. Festinger, Leon, Schachter, S., & Back, K. Social Pressures in Informal Groups. New York, Harper & Brothers, 1950. pp. 34-59.
3. Gans, Herbert J. The Levittowners: Way of Life and Politics in a New Suburban Community. New York, Pantheon Books, 1967. p. 280.
4. Willmott, Peter. "Housing Density and Town Design in a New Town." Town Planning Review. London, July 1962, Vol. 34. p. 125.
5. Whyte, William H. The Organization Man. New York, Simon and Schuster, 1956. p. 351.
6. Cooper, Clare. "St. Francis Square: Attitudes of its Residents." AIA Journal. December 1971. p. 23.
7. Whyte, William H. op. cit. p. 332.
8. Ibid. p. 343.
9. Saile, David G., Borooah, R., & Williams, M.G. "Families in Public Housing: A Study of Three Localities in Rockford, Illinois." Environmental Design Research Association: Proceedings of the Annual Conference, 1972. p. 13-7-6.

Design Element: RAISED SIDEWALK AND GRASS AROUND
THE PARKING AREA





2. DESIGN ELEMENT: Raised Sidewalk and Grass Around the Parking

General Remark:

The physical arrangement of various design features, such as common facilities, stoops, pavements, paths, etc., that people use while leaving and entering their houses determines the possibility of passive contacts and subsequent family friendships, as stated in the studies of Festinger, et al.,¹ Whyte,² and Cooper.³

In the study by Alexander, et al., it was stated that when a car is put down 50 centimeters below the pedestrian path, people feel certain that the car cannot climb the curb. Thus it consequently gives the pedestrian world more importance.⁴

PATTERN

Within each cluster is a court which encompasses private sidewalks, a semi-public walkway, and small patches of grass areas.

ANTICIPATED BEHAVIOR

- a. The study of Coates and Sanoff has shown that children between the ages of 14-18, frequently in groups of 2 to 6 persons, generally engaged themselves in passive plays such as conversation and observation.⁵

The sidewalk is raised 18", and is designed around the perimeter of the parking lots.

- b. Whyte states, "Children have a way of playing where they feel like playing, their congregating areas have not turned out to be exactly where elders planned them to be. Children play where they can use their toy vehicles, and so they play on pavements." 6
- c. White's study indicates that a court of a barren and unimaginative nature is least suitable for toddlers. He further adds that small children like to play with sand, dry earth and rough grass and least care for the smooth grass. If such opportunities are not there, children from 2 to 5 years engage themselves in activities such as running with or without a ball, and cycling round on their small tricycles in great arcs. They circle about the empty yards in the morning and afternoon. His study also revealed that gang

games were most frequently played in the court-
yards by both sexes and by all ages ranging
from 4 to 14 years, although boys in the age
group 6 to 12 years predominated.⁷

1. Festinger, Leon, Schachter, S., & Back, K. Social Pressures in Informal Groups. New York, Harper & Brothers, 1950. pp. 34-59.
2. Whyte, William H. The Organization Man. New York, Simon and Schuster, 1956. p. 330.
3. Cooper, Clare. "St. Francis Square: Attitudes of its Residents." AIA Journal. December 1971. pp. 22-27.
4. Alexander, Christopher, Hirshen, S., Ishikawa, S., Coffin, C., & Angel, S. Houses Generated by Patterns. Berkeley, California, Center for Environmental Structure, April 1970. pp. 82-83.
5. Coates, Gary, & Sanoff, Henry. "Behavioral Mapping: The Ecology of Child Behavior in a Planned Residential Setting." Environmental Design Research Association: Proceedings of the Annual Conference, 1972. Vol. 1. p. 13-24.
6. Whyte, William H. op. cit., p. 343.
7. White, L.E. "The Outdoor Play of Children Living in Flats: An Enquiry into the Use of Courtyards as Playgrounds." Article 38 in Environmental Psychology: Man and His Physical Setting. ed. Proshansky, H.M., Ittelson, W.H., & Rivlin, L.G. New York, Holt, Rinehart and Winston, Inc., 1970. p. 376.

Design Element: STEPS



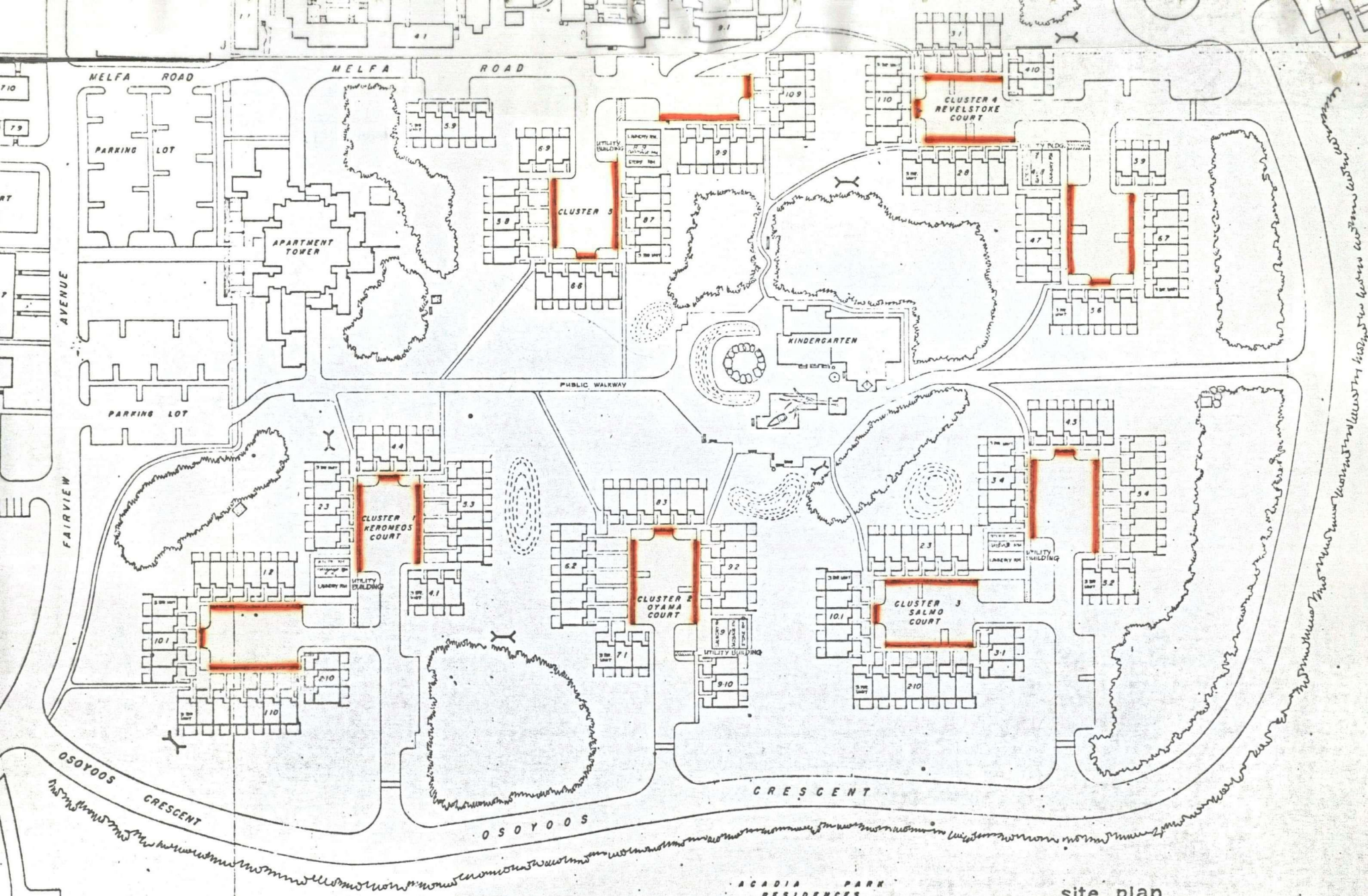


FIGURE 10 LOCATION OF STEPS SHOWN IN COLOUR.



site plan
ACADIA PARK UBC
married graduate student residences

SCALE IN FEET
0 50 100 200

3. DESIGN ELEMENT: Steps

PATTERN

Steps are provided to connect upper level pedestrian sidewalks to parking lots within the courtyards.

ANTICIPATED BEHAVIOR

- a. Whyte stated that where driveways meet, they create a natural setting for baby watching and gossiping; and friendship among residents is more apt to grow there than across the unbroken stretch of lawn.¹
- b. The study of Alexander, et al. pointed out that when there are areas in public places which are slightly raised and accessible by steps surrounding the areas, people naturally gravitate towards them. These areas provide a vantage point from where they can see the action as a whole.
- c. They also added that changes of levels play an important role during social gatherings in that

they provide for the people special places to sit, a place from which to speak, and a place from which to look at other people.²

1. Whyte, William H. The Organization Man. New York, Simon and Schuster, 1956. p. 344.
2. Alexander, Christopher, Hirshen, S., Ishikawa, S., Coffin, C., & Angel, S. Houses Generated by Patterns. Berkeley, California, Center for Environmental Structure, April 1970, p. 136; and
Alexander, Christopher, Ishikawa, S., & Silverstein, M. A Pattern Language Which Generates Multi-Service Centers. Berkeley, California, Center for Environmental Structure, 1968. p. 249.

Design Element: CAR PARKING AREA



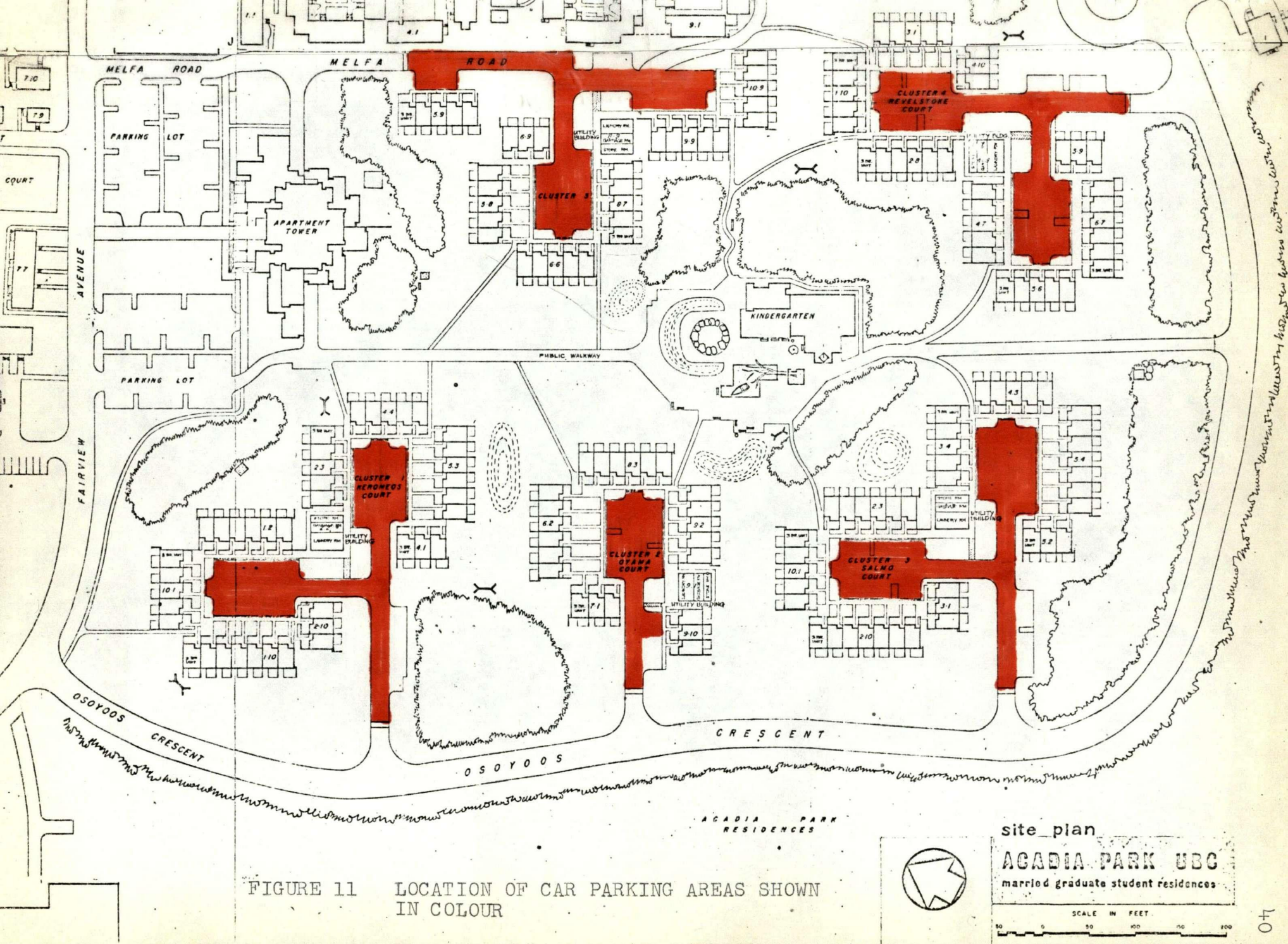


FIGURE 11 LOCATION OF CAR PARKING AREAS SHOWN IN COLOUR

4. DESIGN ELEMENT: Car Parking Area

PATTERN

Two cul-de-sac parking lots for approximately 40 cars are provided within the courtyard in each cluster (i.e. one car space per family). The parking lots are surrounded by pedestrian sidewalks raised by 18 inches.

- a. Alexander, et al. state that any area which holds more than 8 cars is identified as a 'car dominated territory'. If such an area contains a large number of cars whereby the traffic becomes unpredictable, then it is considered dangerous for children.¹
- b. The studies of Whyte² and Lansing, et al.³ have inferred that neighbourhoods based on a cul-de-sac system are considered quiet, conducive to knowing neighbours, and safe for children to play.
- c. It was stated in the studies of Alexander, et al.⁴ and Whyte⁵ that a great deal of everyday social life happens where car and pedestrian

meet. Children seem to enjoy playing here because of the diverse activities being performed in this locale, namely, deliverymen delivering their goods, fathers washing their cars on weekends, and the conversation and discussion promoted among the men while working in the communal parking lots.

- d. White observed that when mothers consider a play area to be safe for their children they allow them to play there unattended, otherwise the mothers forbid them.⁶
- e. The study conducted by Coates and Sanoff found that teenagers and adults were frequently engaged in repairing or observing car repairs and general conversation in parking lots.⁷

- f. The studies done by White⁸ and Whyte⁹ reveal that a large area of asphalt attracts children playing with their wheeled toys as this area offers them a wide expanse for wheeling around on their own vehicles.
- g. The study of Saile, et al. indicates that parking courts were very popular play areas among children.¹⁰ Their observations also suggest that less than half of the families own automobiles, and the parking provision of 1.5 car spaces per family is never used to more than half its capacity.¹¹

1. Alexander, Christopher, Hirshen, S., Ishikawa, S., Coffin, C., & Angel S. Houses Generated by Patterns. Berkeley, California, Center for Environmental Structure, April 1970. p. 70.
2. Whyte, William H. Cluster Development. New York, American Conservation Association, 1964. p. 30.
3. Lansing, John B., Marans, R.W., & Zehner, R.B. Planned Residential Environmentals. Survey Research Center, Institute for Social Research, The University of Michigan, Ann Arbor, 1970.
4. Alexander, Christopher, Hirshen, S., Ishikawa, S., Coffin, C. & Angel, S. op. cit. pp. 79-81.
5. Whyte, William H. op. cit. p. 87.
6. White, L.E. "The Outdoor Play of Children Living in Flats: An Enquiry into the Use of Courtyards as Playgrounds." Article 38 in Proshansky, H.M., Ittelson, W.H., & Rivlin, L.G. Environmental Psychology: Man and His Physical Setting. New York, Holt, Rinehart and Winston, Inc., 1970. p. 376.
7. Coates, Gary & Sanoff, Henry. "Behavioral Mapping: The Ecology of Child Behavior in a Planned Residential Setting." Environmental Design Research Association: Proceedings of the Annual Conference, 1972.
8. White, L.E. op. cit. p. 377.
9. Whyte, William H. op. cit. p. 87.
10. Saile, David G., Borooah, R., & Williams, M.G. "Families in Public Housing: A Study of Three Localities in Rockford, Illinois." Environmental Design Research Association: Proceedings of the Annual Conference, 1972. Vol. 1, p. 13-7-6.
11. Ibid. p. 13-7-7.

Design Element: LAUNDRY FACILITY



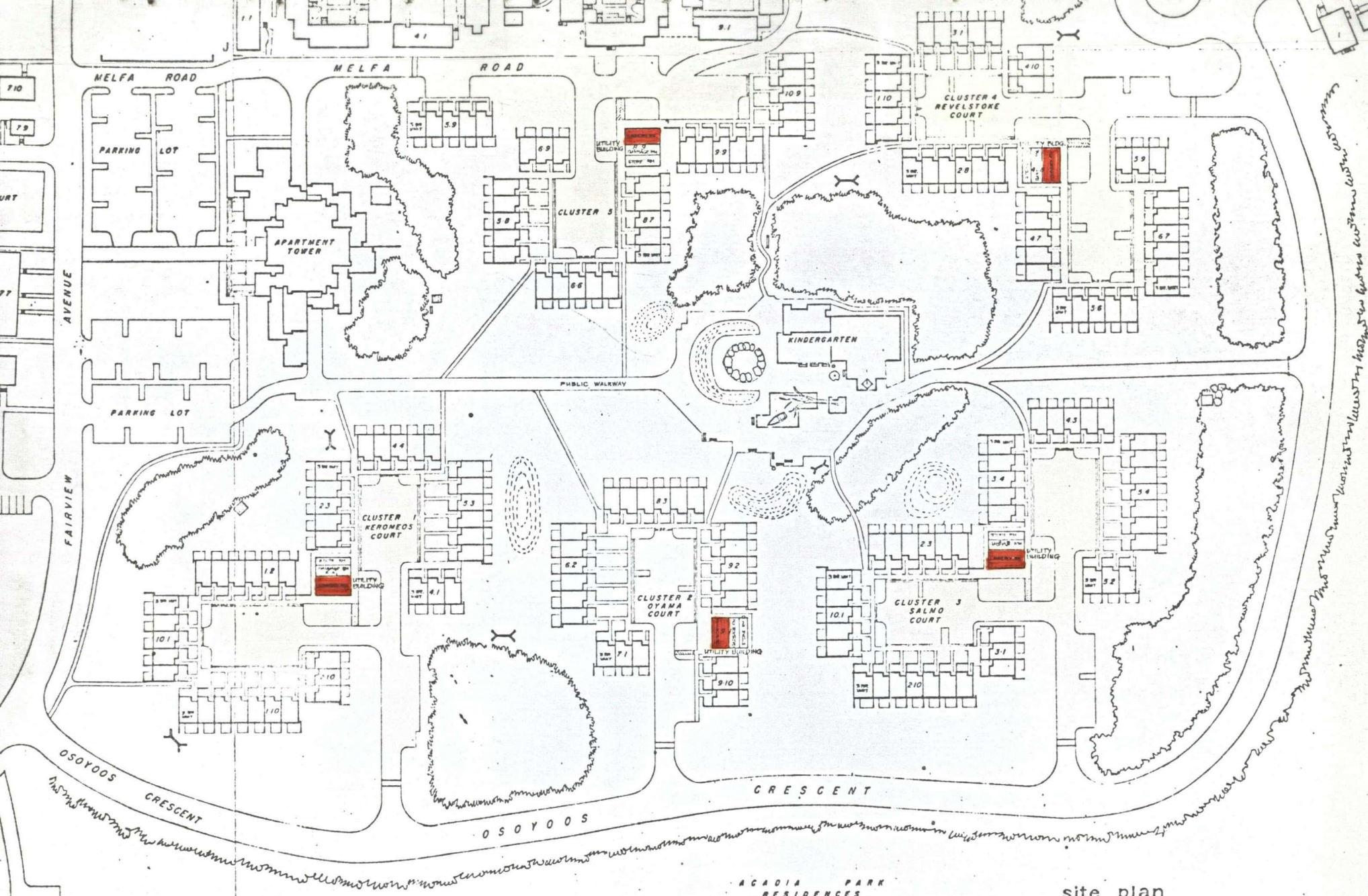
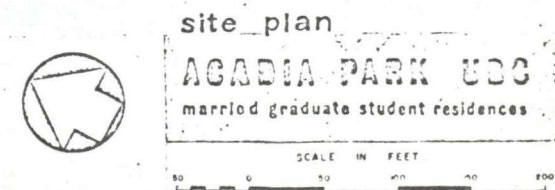


FIGURE 12 LOCATION OF LAUNDRY FACILITY SHOWN IN COLOUR



5. DESIGN ELEMENT: Laundry Facility

General Remark:

Cooper's study states that few residents report meeting people through conversations in the laundry area, and only a small fraction of people said that they stay there while the clothes are in the washer or dryer. The majority of the children who use the play area adjacent to the laundry area come there on their own.¹

PATTERN

Communal laundry area in a separate building is provided within each cluster.

ANTICIPATED BEHAVIOR

- a. The observations of Coates and Sanoff suggest that teenagers between the ages of 14-18 years were frequently seen hanging wash.²
- b. The study conducted by Canadian Environmental Sciences in 1969 in favour of Acadia, Stage II Married Student Housing Program, University of British Columbia, proposed:

There should be a play area adjoining whatever laundry facilities are created, separated from the machines by a low partition, large enough for a few toddlers to pull toys or ride kiddy cars in. A table and a few benches, a few shelves for storage and an extra electric outlet would enable the mothers to have a cup of coffee together while the laundry is washing and the children are safely playing.³

1. Cooper, Clare. "St. Francis Square: Attitudes of its Residents."
AIA Journal. December 1971. p. 25.
2. Coates, Gary, & Sanoff, Henry. "Behavioral Mapping: The Ecology of Child Behavior in a Planned Residential Setting." Environmental Design Research Association: Proceedings of the Annual Conference, 1972.
Vol. 1, p. 13-2-4.
3. Canadian Environmental Sciences. Acadia, Stage II: University of British Columbia Married Student Housing Program. Vancouver, 1969.
Appendix 'H', p. 2.

Design Element: PATIO



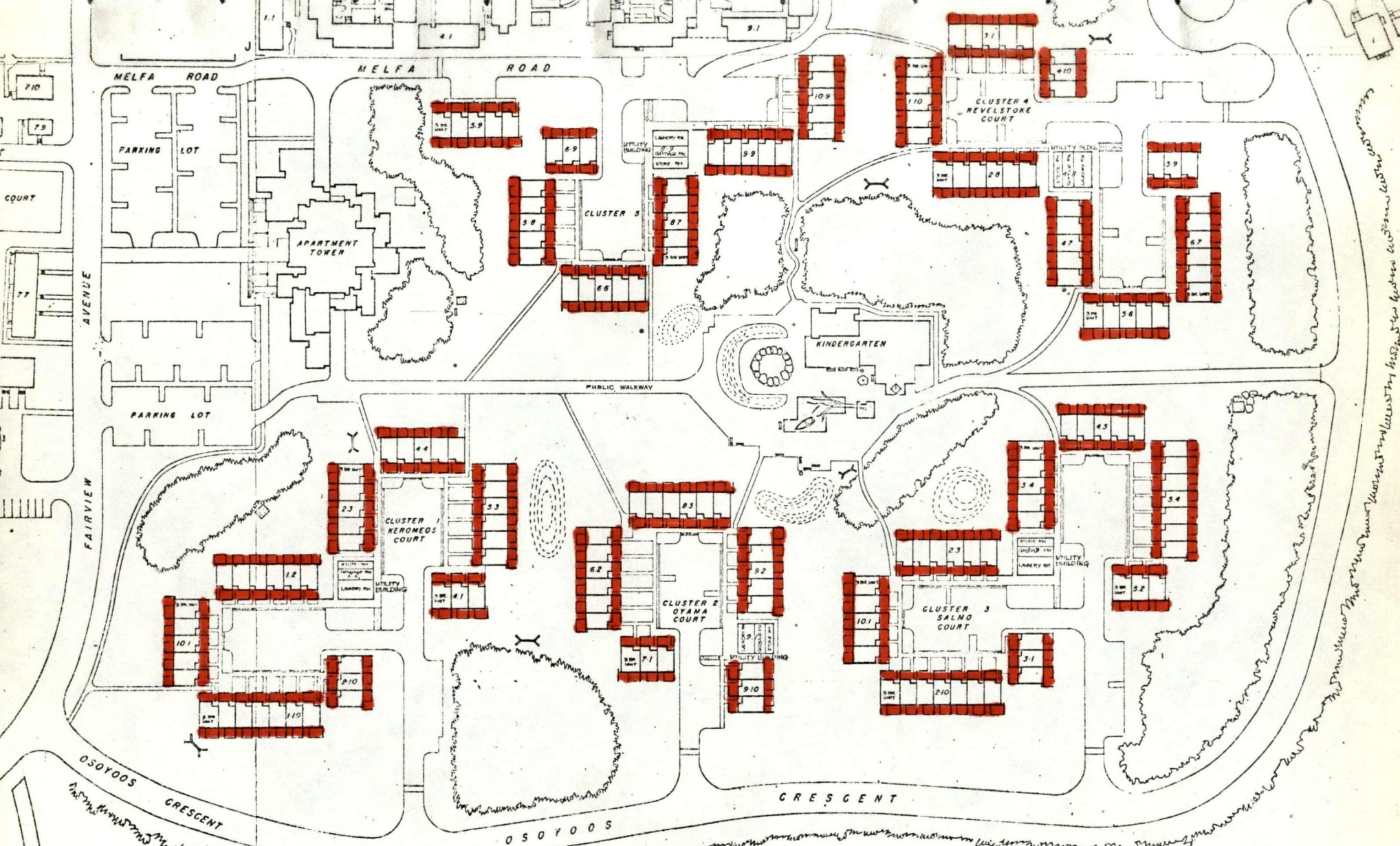


FIGURE 13 LOCATION OF PATIOS SHOWN IN COLOUR

ACADIA PARK
RESIDENCES

site plan

ACADIA PARK UBC
married graduate student residences

SCALE IN FEET

0 10 20 30 40 50 60 70 80 90 100

6. DESIGN ELEMENT: Patio

General Remark:

Whyte states that a patio with high walls without perforation provides maximum privacy. However, it reduces the ability of the private and public areas to borrow space from each other.¹

Whyte mentions that when a fence is designed for the safety of children, residents do not complain about it.² He also says that patios in a cluster design are generally fenced in order to achieve visual privacy.³

PATTERN

6A. An entry patio
16' 3" x 8' 3"
enclosed within
high walls is
attached to each
unit. Except for
a view from the

ANTICIPATED BEHAVIOR

- a. The observation of Alexander, et al. reveals that patios which are enclosed with high walls become claustrophobic. The patios that lack natural continuum to activities in the house remain unused.⁴
- b. Whyte's study shows that small yards are not extensively used by the residents.⁵

kitchen window, this patio has no other connection to the interior of the unit.

6B. Attached to each unit is an unfenced patio 16' 3" x 9' 0" overlooking which is the living room of the unit.

- c. Whyte, during his study of 'Cluster Development' and Cooper in her study of 'St. Francis Square', have found that residents felt that a patio attached to the living room makes the apartment 'seem bigger' and enables them to wander out for a little fresh air, and to call out to children or to watch some activity outside.⁶
- d. The studies done by Whyte,⁷ Coates and Sanoff,⁸ and Cooper⁹ have disclosed that items such as charcoal grills, lawn furniture, play equipment, bicycles, brooms, mops and pails, etc. were frequently observed on patios.

- e. The study of Coates and Sanoff has also indicated that the teenagers were frequently observed in the backyards involved in some sort of work, whereas the young children engaged themselves in activities such as bicycle (tricycle) riding, object play and ball play in this area. On the other hand, Cooper's study showed that the chief uses of patios, in order of importance, were sitting outside, gardening and raising plants, barbecuing, doing small domestic repair jobs, building or repairing furniture, having parties and keeping children in.
- f. A study conducted by Canadian Environmental Sciences has suggested that: "there shall be partially covered and enclosable outdoor play area adjacent to the 'rear' of each unit,

observable from the kitchen area (Appendix H)
included in this area shall be a small outdoor
storage unit (suitable for tricycles, garden
equipment, furniture)." 10

1. Whyte, William H. Cluster Development. New York, American Conservation Association, 1964. p. 86.
2. Whyte, William H. The Organization Man. New York, Simon and Schuster, 1956. Chapter 27.
3. Whyte, William H. op. cit. p. 86.
4. Alexander, Christopher, Hirshen, S., Ishikawa, S., Coffin, C., & Angel, S. Houses Generated by Patterns. Berkeley, California, Center for Environmental Structure, April 1970. p. 121.
5. Whyte, William H. Cluster Development. New York, American Conservation Association, 1964. p. 42.
6. Ibid. p. 31.
7. Whyte, William H. Cluster Development. op. cit. p. 47.
8. Coates, Gary, & Sanoff, Henry. "Behavioral Mapping: The Ecology of Child Behavior in a Planned Residential Setting." Environmental Design Research Association: Proceedings of the Annual Conference, 1972. p. 13-2-9.
9. Cooper, Clare. op. cit. pp. 26-27.
10. Canadian Environmental Sciences. Acadia, Stage II: University of British Columbia Married Student Housing Program. Vancouver, 1969. p. 22.

Design Element: WOODS



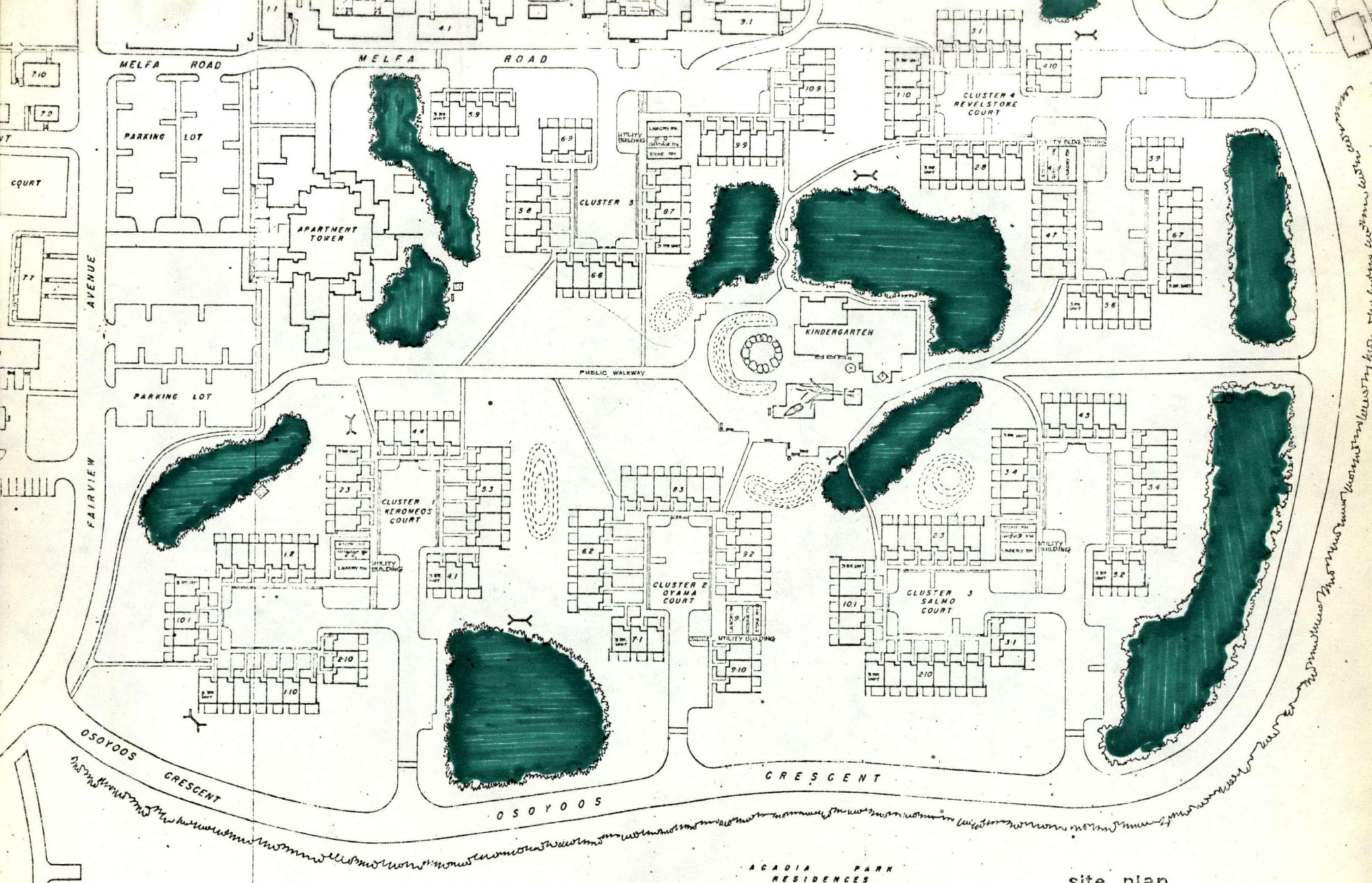


FIGURE 14 LOCATION OF WOODED AREAS SHOWN IN COLOUR

ACADIA PARK RESIDENCES

site plan

ACADIA PARK UBC

married graduate student residences

SCALE IN FEET

0 50 100 150 200

7. DESIGN ELEMENT: Woods

General Remark:

The study conducted by Canadian Environmental Sciences has suggested that an adventure playground should be somewhat removed from the dwelling units for children over six years of age. They wrote, "An adventure playground, by definition, challenges children to create their own environment . . . so if the area is treed, tree houses will emerge; if hilly, steps and slides and perhaps water creeks might appear."¹

Whyte says that people who are unfamiliar with wooded areas consider them a menace and forbid their children to go near them.²

PATTERN

Clusters of trees
remote from the
dwelling units
having rough
undulated ground

ANTICIPATED BEHAVIOR

- a. White's study reveals that the older children, in spite of restrictions imposed, attempt to explore adventurous areas. They prefer those areas which provide an opportunity for secrecy, (example given: sheds, caves, hidden corners in

are scattered throughout the development.

woods, etc.).³

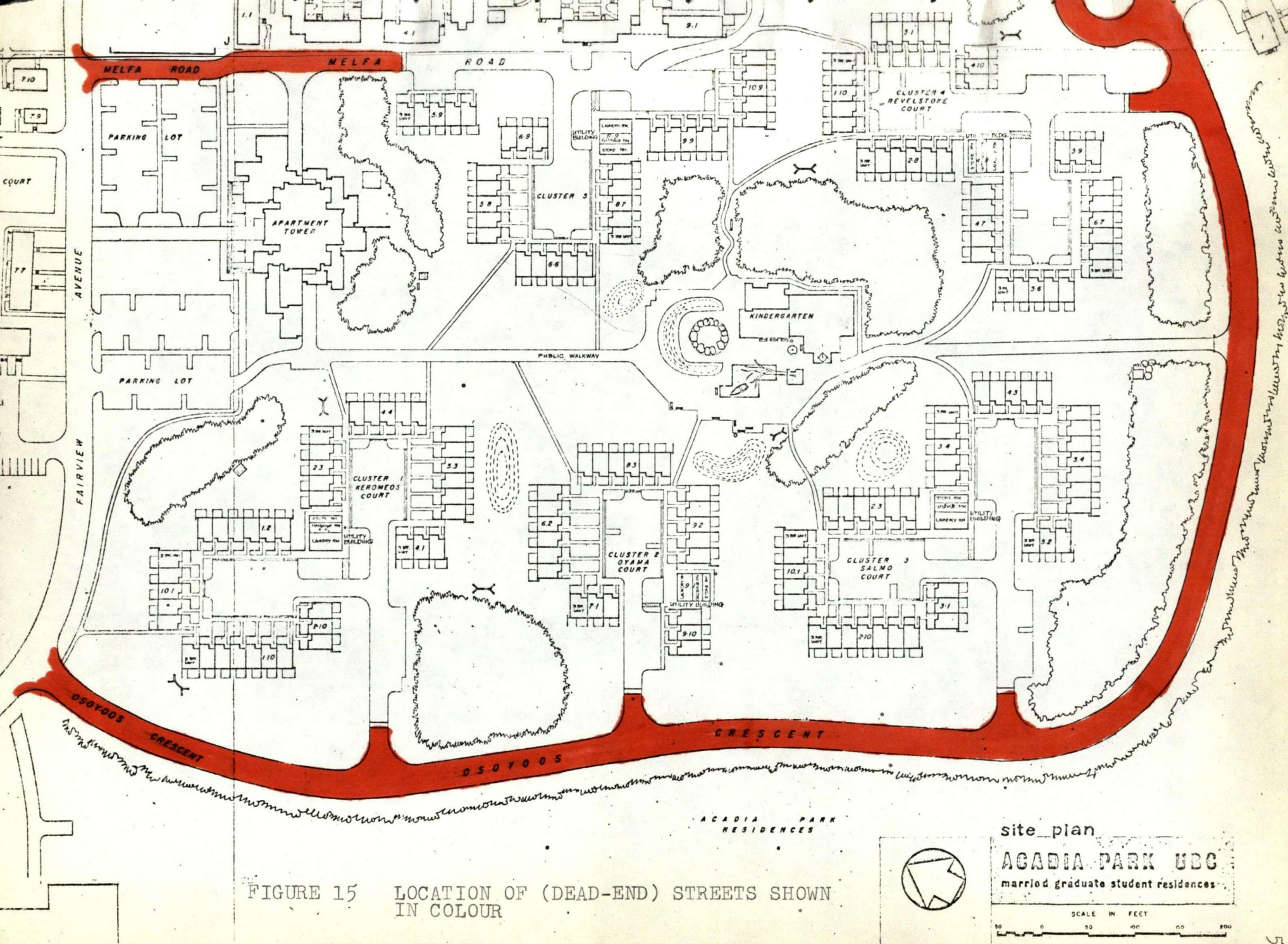
- b. The study by Coates and Sanoff found that children from 6 to 13 years of age were frequently engaged in plays such as exploring, hunting and camping which were participated in by groups of 2 to 3 persons.⁴
- c. Cooper says that the adventure playgrounds tend to attract and absorb the interest of more children than other playgrounds, and the prime users range from 5 to 17 years of age. She stated:

One of the most popular activities on all adventure playgrounds is the construction of dens and houses . . . manipulating elements of the natural environment - earth, water, fire, wood, plants - is something that we try to deter children from doing in our 'neat' urban environments; but trees climbed, holes dug, 'houses' built in the landscaped areas of housing developments bear witness to the fact that children desperately need a place where they are permitted to do these things.⁵

1. Canadian Environmental Sciences. Acadia, Stage II: University of British Columbia Married Student Housing Program. Vancouver, 1969.
Appendix 'H', p. 5.
2. Whyte, William H. Cluster Development. New York, American Conservation Association, 1964. pp. 42-44.
3. White, L.E. "The Outdoor Play of Children Living in Flats: An Enquiry into the Use of Courtyards as Playgrounds." Article 38 in Proshansky, H.M., Ittelson, W.H., & Rivlin, L.G. Environmental Psychology: Man and His Physical Setting. New York, Holt, Rinehart and Winston, Inc., 1970. p. 377.
4. Coates, Gary & Sanoff, Henry. "Behavioral Mapping: The Ecology of Child Behavior in a Planned Residential Setting." Environmental Design Research Association: Proceedings of the Annual Conference, 1972. Vol. 1, p. 13-2-4.
5. Cooper, Clare. The Adventure Playground: Creative Play in an Urban Setting and a Potential Focus for Community Involvement. Berkeley, University of California, Institute of Urban & Regional Development, 1970. p. 17.
6. Ibid. p. 13.

Design Element: STREET





8. DESIGN ELEMENT: Street

General Remark:

William H. Whyte's study suggests that adults perceive streets with heavy traffic as boundaries and hence forbid their children from crossing them.¹ The study conducted by Alexander, et al. has deduced that a looped local road is safe and feels safe, as long as it serves less than 50 cars.² L.E. White found that children do not make sufficient use of the planned play areas if they are to cross a heavy traffic street to reach them.³

PATTERN

The main traffic streets serving the entire development are located on its periphery.

ANTICIPATED BEHAVIOR

- a. Herbert Gans states that the road system which keeps the through traffic out of the development makes the setting safer for children's play.⁴ Cooper's study supports Gans' statement that the residents consider the road system which keeps the through traffic out of the development as a

safer and better quality place for raising children since the environment enables them to play, explore, visit friends and walk to school in complete safety. Her observation indicates that children play anywhere and everywhere - not just where the designers indicated 'playground' on the plan.⁵

- b. Bicycle riding and walking on the streets were frequently observed by Coates and Sanoff during their study. They found that the prime users of this area were adolescents, the majority of whom were females.⁶

1. Whyte, William H. The Organization Man. New York, Simon and Schuster, 1956. p. 347.
2. Alexander, Christopher, Hirshen, S., Ishikawa, S., Coffin, C., & Angel, S. Houses Generated by Patterns. Berkeley, California, Center for Environmental Structure, April 1970. pp. 64-65.
3. White, L.E. "The Outdoor Play of Children Living in Flats: An Enquiry into the Use of Courtyards as Playgrounds." Article 38 in Proshansky, H.M., Ittelson, W.H., & Rivlin, L.G. Environmental Psychology: Man and His Physical Setting. New York, Holt, Rinehart and Winston, Inc., 1970. p. 375.
4. Gans, Herbert J. The Levittowners: Way of Life and Politics in a New Suburban Community. New York, Pantheon Books, 1967. p. 280.
5. Cooper, Clare. op. cit. p. 22.
6. Coates, Gary, & Sanoff, Henry. "Behavioral Mapping: The Ecology of Child Behavior in a Planned Residential Setting." Environmental Design Research Association: Proceedings of the Annual Conference, 1972. Vol. 1, p. 13-2-7.

Design Element: PUBLIC WALKWAY



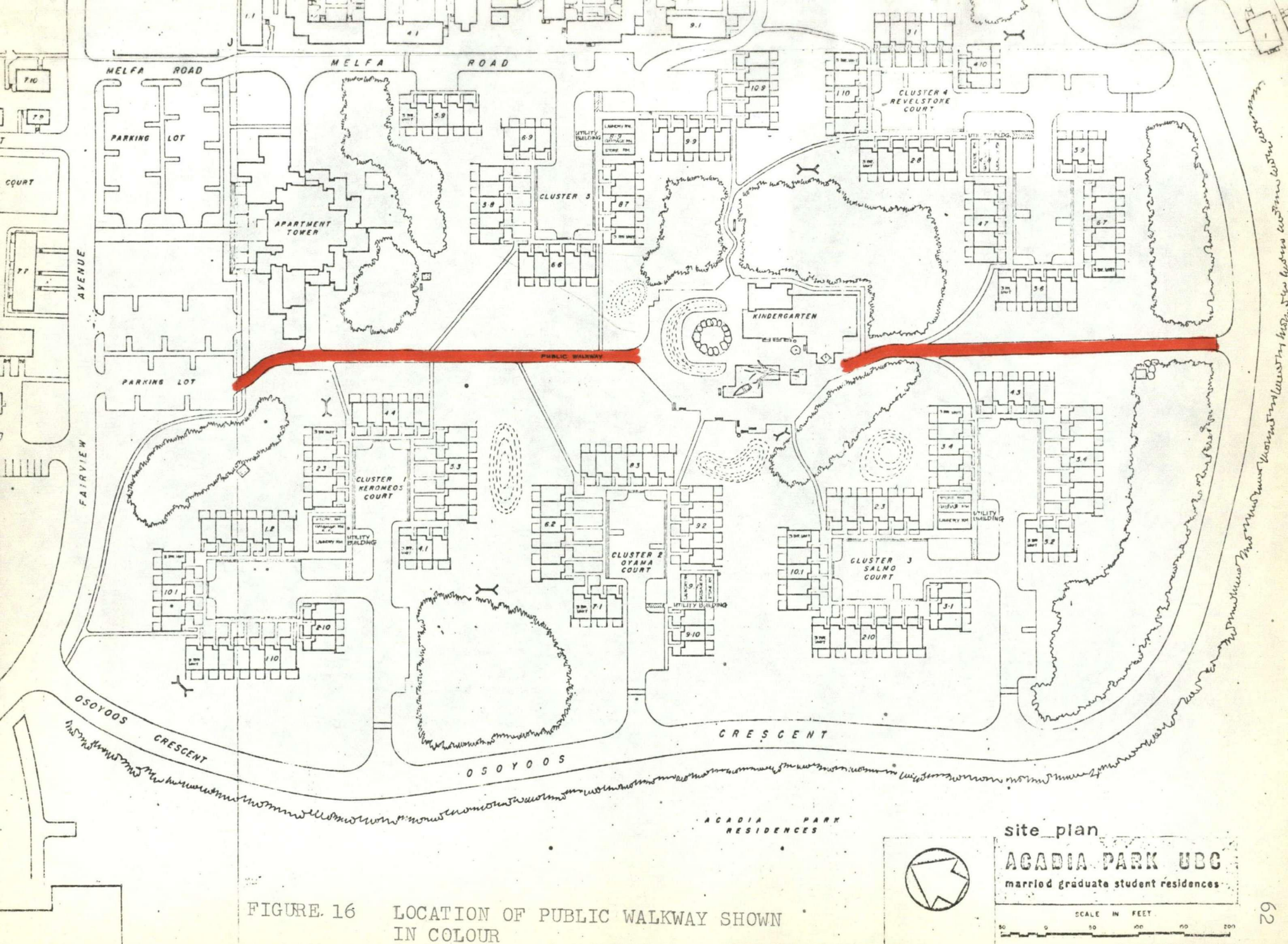


FIGURE. 16 LOCATION OF PUBLIC WALKWAY SHOWN IN COLOUR

site plan
ACADIA PARK UBC
married graduate student residences

SCALE IN FEET
0 50 100 150 200

9. DESIGN ELEMENT: Public Walkway

PATTERN

The public sidewalks of the clusters are connected to the main traffic-free pedestrian walkway which runs in the middle of the development in the direction of Northwest-Southeast.

ANTICIPATED BEHAVIOR

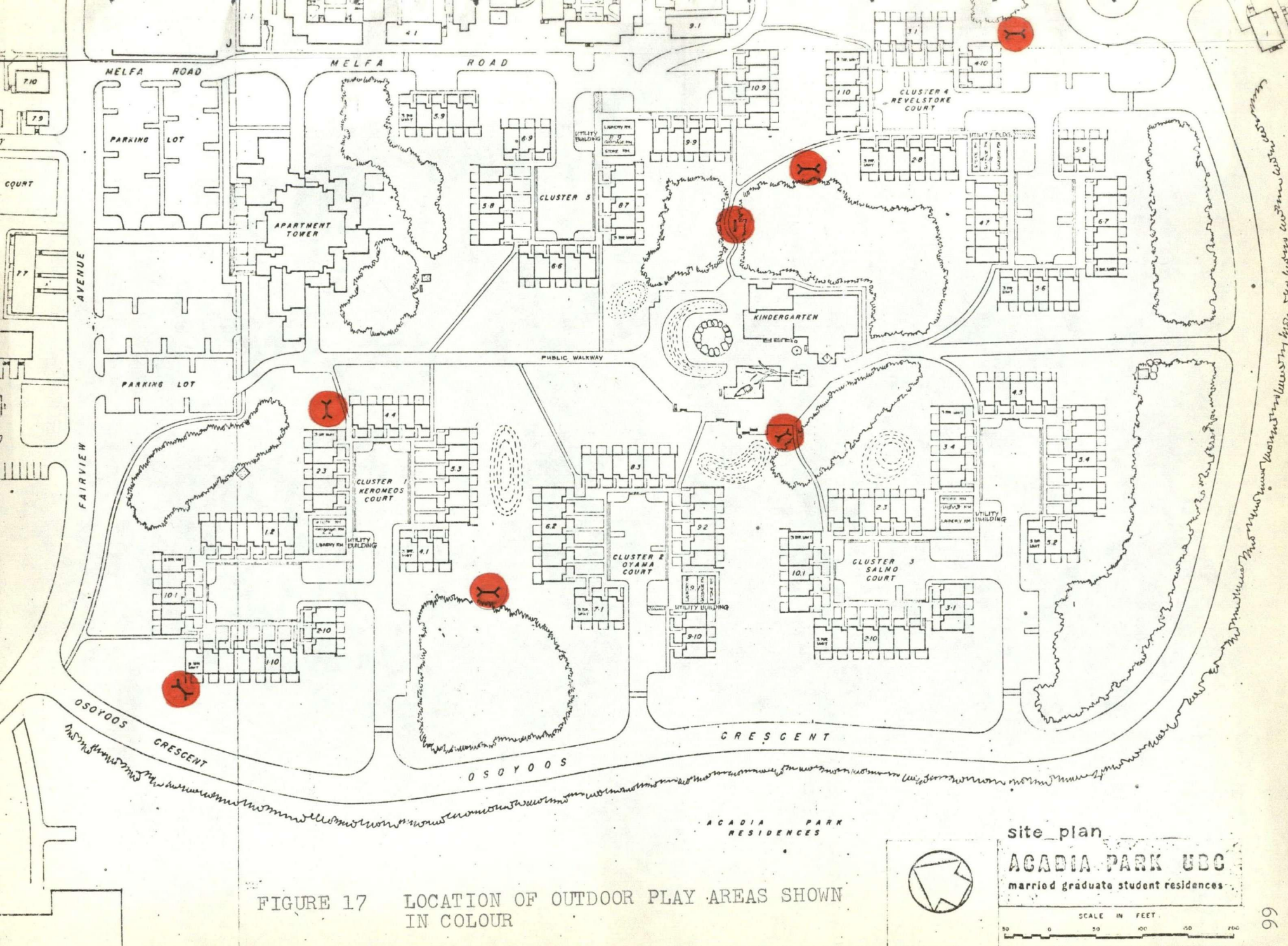
- a. The study conducted by Gans found that the newcomers who have no previous contacts in the community frequently loiter on sidewalks with the hope of meeting their neighbours.¹
- b. Clare Cooper's study reveals that residents feel that a traffic-free pedestrian walkway encourages walking and casual encounters. As well it discourages large numbers of strangers from wandering about.²
- c. People feel safe and comfortable when large numbers of people are in sight, as claimed by Alexander, et al.³

- d. The study done by Saile, et al. has revealed that cyclists made more use of the central sidewalk (which was designed to collect the pedestrian traffic through the site towards the main road) than the pedestrians, who tended to follow shortcuts. They have also stated that if pedestrian routes on the site are not direct, residents will make their own paths.⁴

1. Gans, Herbert J. The Levittowners: Way of Life and Politics in a New Suburban Community. New York, Pantheon Books, 1967. p. 46.
2. Cooper, Clare. "St. Francis Square: Attitudes of its Residents." AIA Journal. December 1971. pp. 23-27.
3. Alexander, Christopher, Hirshen, S., Ishikawa, S., Coffin, C., & Angel, S. Houses Generated by Patterns. Berkeley, California, Center for Environmental Structure, April 1970. p. 91.
4. Saile, David G., Borooah, R., & Williams, M.G. "Families in Public Housing: A Study of Three Localities in Rockford, Illinois." Environmental Design Research Association: Proceedings of the Annual Conference, 1972. Vol. 1, p. 13-7-7.

Design Element: OUTDOOR PLAY AREA





10. DESIGN ELEMENT: Outdoor Play Area

PATTERN

Play equipment such as, swings and a climbing net are installed at various locations throughout the development.

ANTICIPATED BEHAVIOR

- a. Hole's study of children's play on housing estates revealed that the percentage of children who were engaged in activities, such as, sitting, standing, lying, watching and talking was more than the percentage using apparatus on the playgrounds.¹
- b. The study by Coates and Sanoff,² and that of Sinclair³ found to the contrary, that more children used planned play equipment which promoted intensive activity.
- c. White's study shows that when play equipment is less accessible, its use decreases.⁴

- d. The study by Canadian Environmental Sciences showed that swings and see-saws tend to be dangerous for children from 3 to 6 years of age unless there is constant supervision. They have also suggested that a play area should be physically limited so as to keep older children out of the toddlers' play area. But it should remain readily and easily accessible to children, both visually and physically from home.⁵

1. Hole, Vere. Children's Play on Housing Estates: National Building Studies Research Paper 39. London, Her Majesty's Stationery Office, 1966. pp. 8-10.
2. Coates, Gary & Sanoff, Henry. "Behavioral Mapping: The Ecology of Child Behavior in a Planned Residential Setting." Environmental Design Research Association: Proceedings of the Annual Conference, 1972. Vol. 1, p. 13-2-4.
3. Sinclair, J. A Study of Children's Play Areas in 221-d-3 Housing. San Francisco, University of Berkeley, 1969. p. 5 (unpublished).
4. White, L.E. "The Outdoor Play of Children Living in Flats: An Enquiry into the Use of Courtyards as Playgrounds." Article 38 in Proshansky, H.M., Ittelson, W.H. & Rivlin, L.G. Environmental Psychology: Man and His Physical Setting. New York, Holt, Rinehart and Winston, Inc., 1970. p. 375.
5. Canadian Environmental Sciences. Acadia, Stage II: University of British Columbia Married Student Housing Program. Vancouver, 1969. Appendix 'H', p. 4.

Design Element: SANDBOX



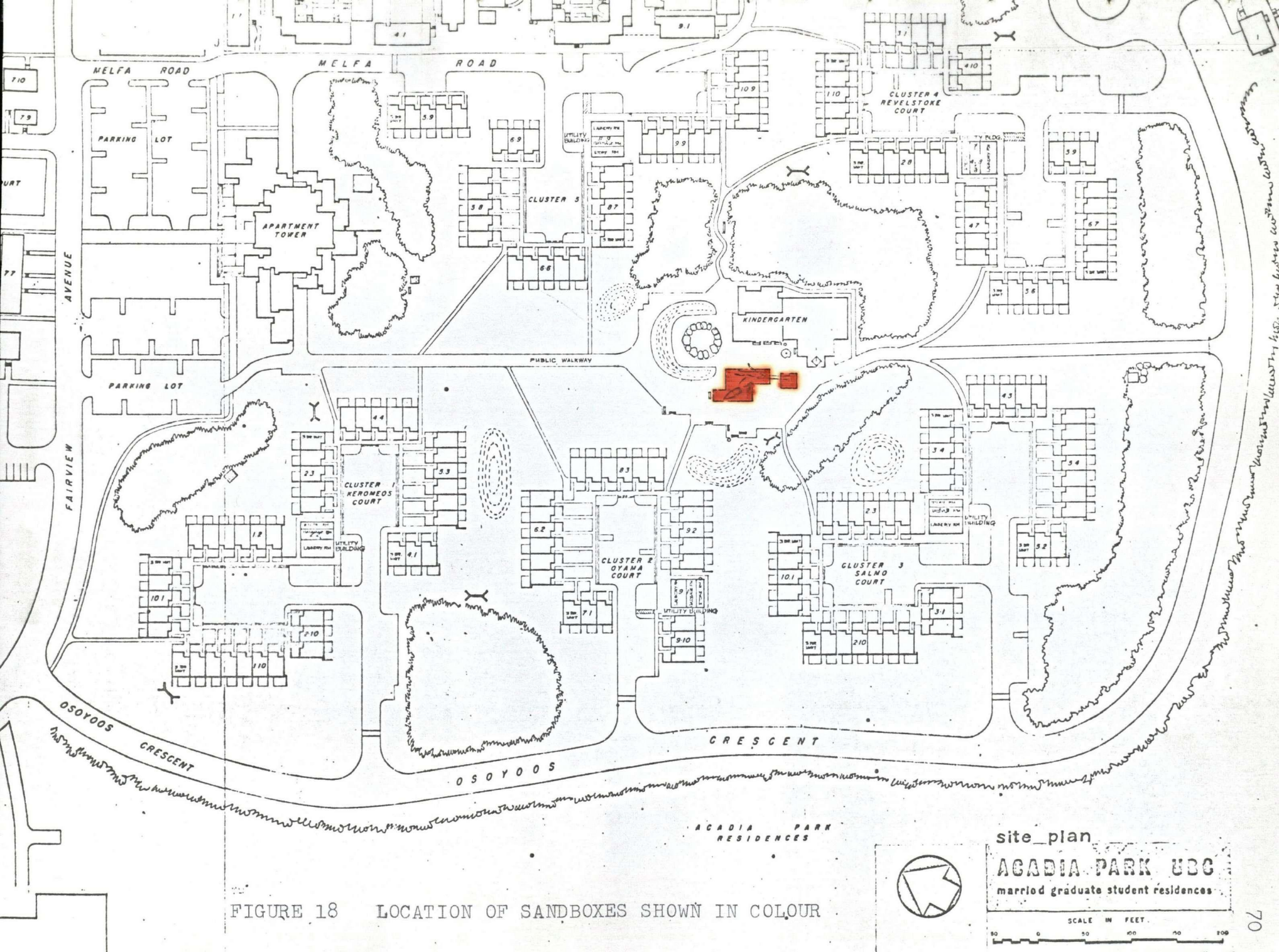


FIGURE 18 LOCATION OF SANDBOXES SHOWN IN COLOUR

site plan
ACADIA PARK UBC
married graduate student residences

SCALE IN FEET
0 50 100 150 200

11. DESIGN ELEMENT: Sandbox

PATTERN

Sandboxes are located
at various places
throughout the
development.

ANTICIPATED BEHAVIOR

- a. The study carried out by White¹ showed that
children like to play with sand and mud.
Alexander, et al.² have suggested that
small children need sand lots, mud, etc.
with which to play.

1. White, L.E. "The Outdoor Play of Children Living in Flats: An Enquiry into the Use of Courtyards as Playgrounds." Article 38 in Proshansky, H.M., Ittelson, W.H. & Rivlin, L.G. Environmental Psychology: Man and His Physical Setting. New York, Holt, Rinehart and Winston, Inc., 1970. pp. 376-379.
2. Alexander, Christopher, Hirshen, S., Ishikawa, S., Coffin, C., & Angel, S. Houses Generated by Patterns. Berkeley, California, Center for Environmental Structure, April 1970, p. 104.

Design Element: DRY TREE





FIGURE 19 LOCATION OF A LARGE DRY TREE SHOWN IN COLOUR



site plan

ACADIA PARK UBC
married graduate student residences

SCALE IN FEET



12. DESIGN ELEMENT: Dry Tree

PATTERN

A large dry tree
with firm branches
is placed within
the sandpit.

ANTICIPATED BEHAVIOR

- a. Sinclair's study revealed that an area with a mountain of logs within the sandpit was a very popular children's play area. The children could climb on these logs and jump into the sandpit.¹
- b. Trees, as a climbing equipment for pre-school children, have been suggested by Alexander, et al.²
- c. White found that children climb fences when they do not have anything else to climb.³

1. Sinclair, J. The Study of Children's Play Areas in 221-d-3 Housing.
University of Berkeley, California, March 1969. p. 3 (unpublished).
2. Alexander, Christopher, Ishikawa, S., & Silverstein, M. A Pattern
Language Which Generates Multi-Service Centers. Berkeley,
California, Center for Environmental Structure, 1968. p. 261.
3. White, L.E. "The Outdoor Play of Children Living in Flats: An Enquiry
into the Use of Courtyards as Playgrounds." Article 38 in
Proshansky, H.M., Ittelson, W.H., & Rivlin, L.G. Environmental
Psychology: Man and His Physical Setting. New York, Holt, Rinehart
and Winston, Inc., 1970. p. 377.

Design Element: ROCKS AND HILLOCKS



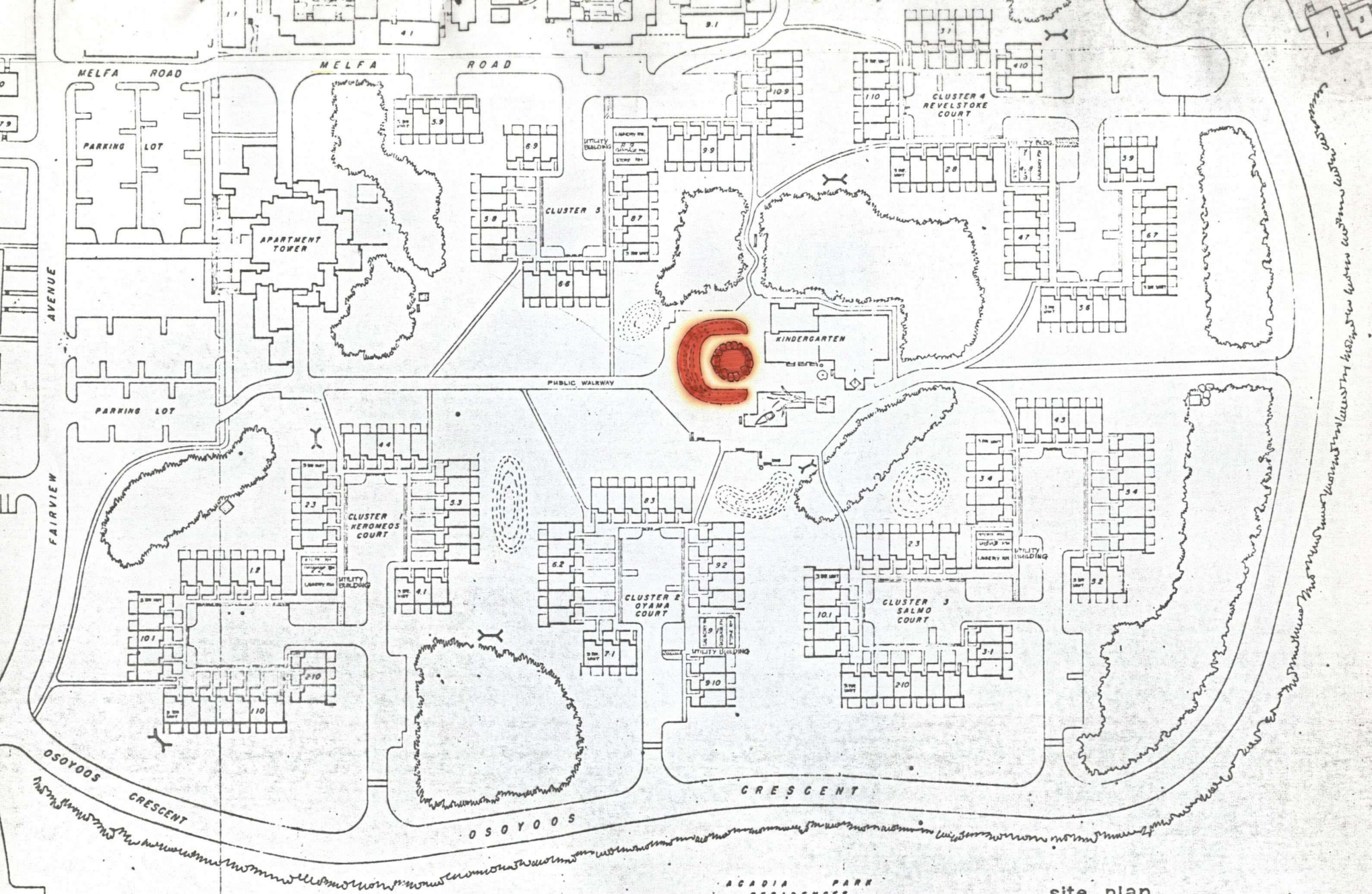


FIGURE 20 LOCATION OF ROCK PIT AND HILLOCK SHOWN IN COLOUR.



site plan
ACADIA PARK UBC
married graduate student residences

SCALE IN FEET
0 50 100 200

13. DESIGN ELEMENT: Rocks and Hillocks

PATTERN

Large rocks are arranged in a cluster on the periphery of the sandbox.

ANTICIPATED BEHAVIOR

- a. Children are specially attracted to rocks and hillocks, as indicated by Whyte's study.¹
- b. White's observation shows that children like to play on construction heaps and debris.²

1. Whyte, William H. Cluster Development. New York, American Conservation Association, 1964. p. 88.
2. White, L.E. "The Outdoor Play of Children Living in Flats: An Enquiry into the Use of Courtyards as Playgrounds." Article 38 in Proshansky, H.M., Ittelson, W.H. & Rivlin, L.G. Environmental Psychology: Man and His Physical Setting. New York, Holt, Rinehart and Winston, Inc., 1970. p. 379.

Design Element: OUTDOOR SEAT



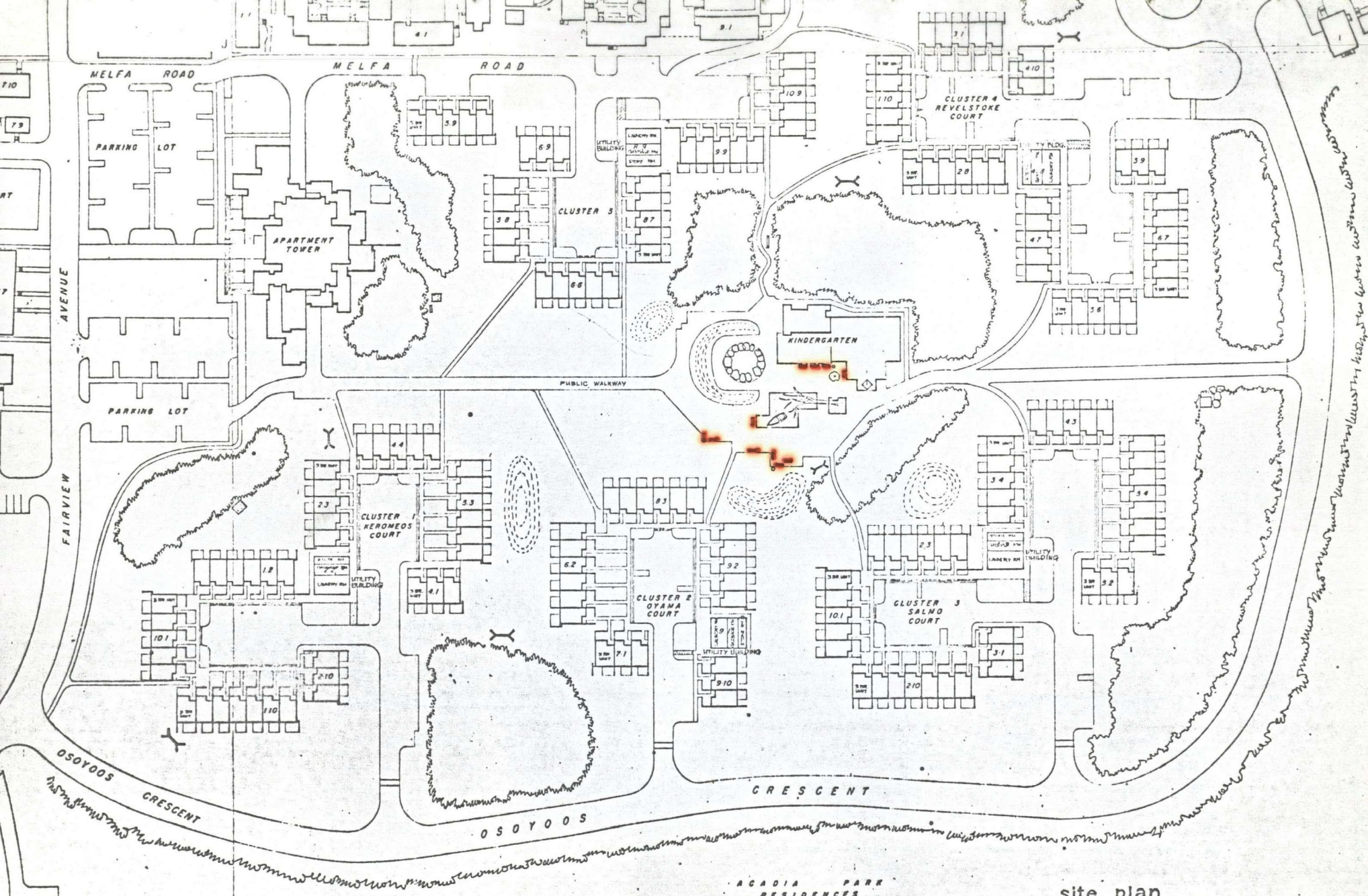
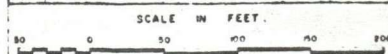


FIGURE 21 LOCATION OF OUTDOOR SEATS SHOWN IN COLOUR



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14. DESIGN ELEMENT: Outdoor Seat

PATTERN

Any seat in a
public space.

ANTICIPATED BEHAVIOR

- a. The observation by Alexander, et al. concludes that when people are given a choice of benches, they select those with best exposure to view, sun and wind.¹

- 1. Alexander, Christopher, Ishikawa, S., & Silverstein, M. A Pattern Language Which Generates Multi-Service Centers. Berkeley, California, Center for Environmental Structure, 1968. p. 173.

Design Element: COMMUNITY PLAY AREA



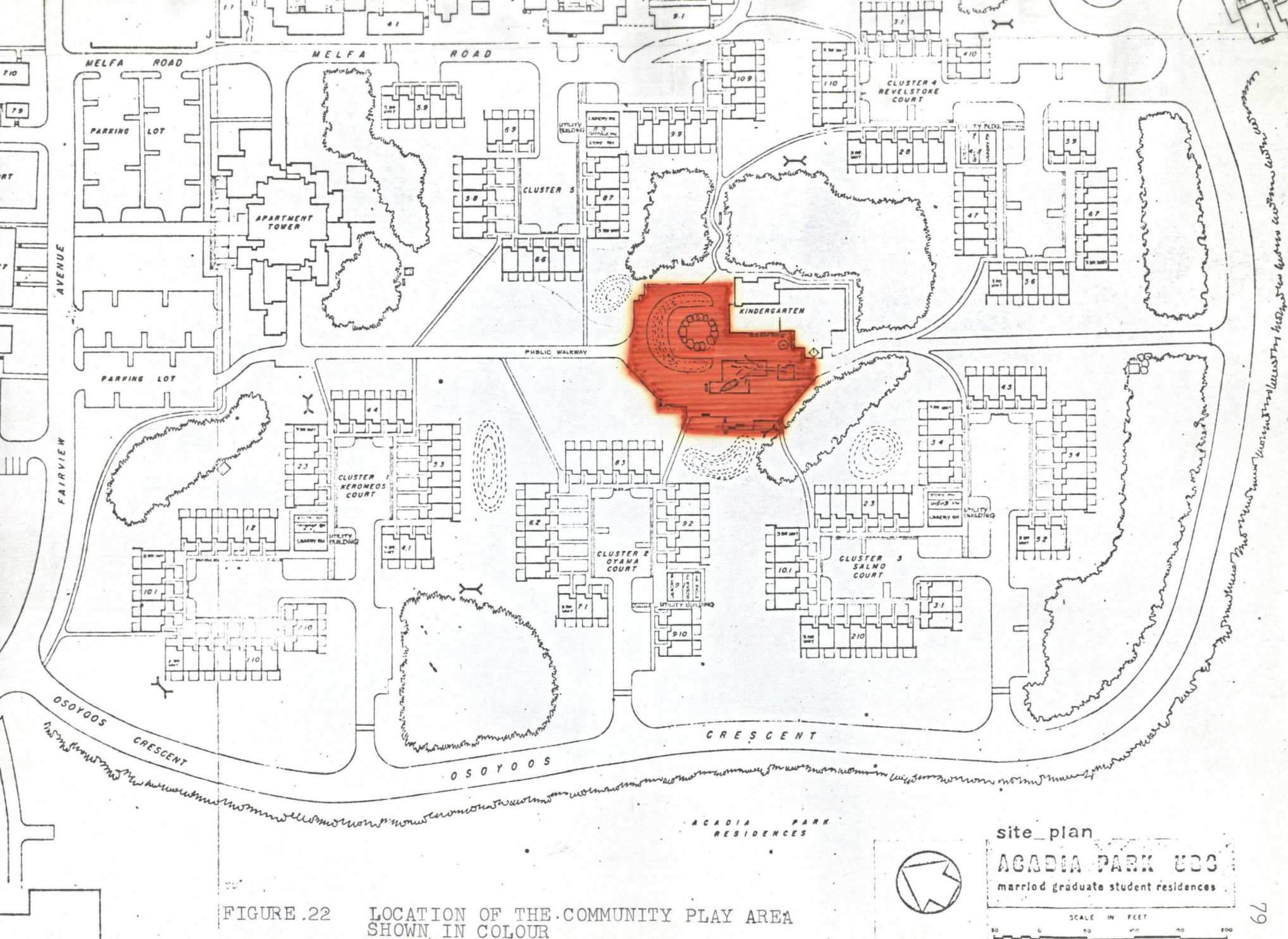


FIGURE .22

LOCATION OF THE COMMUNITY PLAY AREA
SHOWN IN COLOUR



site plan

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SCALE IN FEET



15. DESIGN ELEMENT: Community Play Area

General Remark:

Gans found that the school playgrounds after school hours attract only those children who live close by.¹

PATTERN

In the heart of the development is located the community play area adjacent to the kindergarten school. This play area encompasses sandboxes, a large dry tree, a boat within one of the sandboxes, a rocky area, benches, a large asphalt area, and swings, etc. It is bounded by wooded areas on three sides.

ANTICIPATED BEHAVIOR

- a. Cooper's study of St. Francis Square shows that the central landscaped squares were viewed by the residents as places for chatting, sitting, and meeting other people.²
- b. Alexander, et al. in their study have illustrated that:

In existing modern housing projects, people rarely feel comfortable lingering outside their houses. There are few places where it is 'all right to be'. . . . teenagers, especially, boys, choose special

corners too, where they hang around,
waiting for their friends. . . .
small children need sand lots, mud,
plants, and water to play with in
the open; young mothers who go to
watch their children, often use the
children's play as an opportunity
to meet and talk with other mothers.³

- c. The study of Coates and Sanoff showed
that the community play area was very
popular among children between the ages
of 10-18 years.⁴

1. Gans, Herbert J. The Levittowners: Way of Life and Politics in a New Suburban Community. New York, Pantheon Books, 1967. p. 280.
2. Cooper, Clare. "St. Francis Square: Attitudes of its Residents." AIA Journal. December 1971. p. 23.
3. Alexander, Christopher, Hirshen, S., Ishikawa, S., Coffin, C., & Angel, S. Houses Generated by Patterns. Berkeley, California, Center for Environmental Structure, April 1970. p. 104.
4. Coates, Gary, & Sanoff, Henry. "Behavioral Mapping: The Ecology of Child Behavior in a Planned Residential Setting." Environmental Design Research Association: Proceedings of the Annual Conference, 1972. Vol. 1, p, 13-2-4.

The following are the abstracted expected behavior on which the design elements are evaluated:

<u>DESIGN ELEMENT</u>	<u>OBSERVABLE BEHAVIOR</u>
1. Clustering of Dwelling Units	<ul style="list-style-type: none">a) Different patterns of public behavior can be observed in courts which differ in size and shape.b) There will be more activities within the courtyards than in the planned play areas on the site.
2. Raised Sidewalk and Grass Around the Parking Area	<ul style="list-style-type: none">a) When teenagers and adults are seen, they will be frequently engaged in passive play, such as conversation and observation.b) When children five years and under are observed, they will be seen cycling, running with or without a ball, or playing with their wheeled toys.
3. Steps	<ul style="list-style-type: none">a) The steps will occasionally function as a setting for baby watching and as gossip center.

DESIGN ELEMENT

OBSERVABLE BEHAVIOR

4. Car Parking Areas

- a) A variety of activities such as: deliverymen delivering the goods, residents loading or unloading their commodities, residents washing and repairing their cars, conversation and discussion among men while they are working, and the small children playing with their wheeled toys beside the adults, will be frequently observed within the parking lots.

5. Laundry Facility

- a) Small children can be noticed playing beside the laundry room while mothers are laundering clothes.

6A Entry Patio

- a) Since the entry patios are enclosed by high walls and lack natural continuum to activities within the house, children will not play there.

DESIGN ELEMENT

OBSERVABLE BEHAVIOR

6B. Patio attached to
the Living Room

b) Whenever this patio is used, it will be used for activities such as: sitting outside, gardening and raising plants, barbecuing, doing small domestic repair jobs, having parties, or keeping children in, etc.

7. Woods

a) Whenever woods are explored, they will be explored mostly by the older children from 6 to 13 years of age who will be frequently observed engaged in adventurous activities such as: exploring, hunting, camping, climbing trees, constructing houses, digging holes, etc.

8. Street

a) Other than cars, streets will be utilized mainly for bicycle riding and walking.

<u>DESIGN ELEMENT</u>	<u>OBSERVABLE BEHAVIOR</u>
9. Public Walkway	a) Both pedestrian and cyclists will be frequently observed on the public walkway to which are connected the sidewalks of the clusters.
10. Outdoor Play Areas	a) When swings are used, small children will be observed using them. b) Adults will be seen accompanying the small children to the area equipped with play apparatus since swings, see-saws, etc. tend to be dangerous for children from 3 to 6 years of age, as shown in the study by Canadian Environmental Sciences.
11. Sandbox	a) Small children five years and under engaged in general play will be noticed in the sandboxes.
12. Dry Tree	a) When the dry tree is used, children will be observed climbing upon it and jumping into the sandpit.

<u>DESIGN ELEMENT</u>	<u>OBSERVABLE BEHAVIOR</u>
13. Rocks and Hillocks	a) Whenever rocks and hillocks are used, they will stimulate such activities as, climbing, or, walking, sitting and rolling wheeled toys.
14. Outdoor Seat	a) Whenever a seat is occupied, the occupant will face toward the activity zone.
15. Community Play Area	a) This area will attract residents of all age groups. When adults are accompanying the children in this area they will be seen conversing with other residents.

C H A P T E R I V

PROCEDURE:

The main purpose of the study was to examine the behavioral effects of out-of-house design elements of the Acadia Park Clusters. Since design elements were scattered throughout the development and were difficult to keep track of, it was considered necessary that a systematic observation should be conducted.

The site plan of the Acadia Park Clusters was divided into a series of segments, each of which was about the size of the courtyard of a cluster. Thirty-one segments excluding those having grassy areas near houses were selected according to the following major design elements: (i) courtyard, (ii) wooded area, (iii) play equipment - swings, (iv) community play area, and (v) central public walkway. They were stratified with respect to their major design elements.

When a design element was situated in more than one segment, a random sample of size ($N = 1, 2 \dots 4$) was selected from these segments for observation. They were distributed in the sample as follows:

Of the nine segments (which included courtyards)
four segments were randomly selected = 44%

Of the twelve segments (which included wooded
areas), three segments were randomly selected = 25%

Of the five segments (which included play
equipment), two segments were randomly selected = 40%

The community play area was the only segment
of its kind so it was selected = 100%

Of the four segments (which included central
public walkway), two segments were randomly
selected = 50%

Thus of the thirty-one segments (excluding those having grass areas near houses), a random sample of size twelve segments was selected for observation. (See Figure).

In order to observe people's behavior as they occur in their natural settings, it was essential that the behavioral events be kept free from intrusion. This ensured that the recorded behavior was the reaction to the physical elements of the setting and not to the researcher's presence. An observation route was pre-tested so that an observer could conveniently record all the activities occurring in a given segment without interfering with them.

As the observer visited each segment, the behavior of the people who were there at the moment of the observation was recorded. Any change that occurred while the observer was still at a particular observation point

was ignored. The person and his activities were recorded again if he appeared later in another segment or if he was still in the same segment when the observer returned for the next visit. Each selected segment was observed for a period of two minutes and was visited in strict rotation during a walk-round.

In order to eliminate the influence of the time factor on the number of persons observed and the type of activities observed, half of the walk-rounds were conducted clockwise and the rest anti-clockwise.

A random sample of segments was observed twice daily at 11.15 a.m. and 4.30 p.m. during the period of September 26 to October 16, 1972. At this time almost all the dwelling units in the Acadia Clusters were occupied.

Observations were conducted on week days (Monday to Thursday) and weekends (Saturday) for a period of three weeks. In all, thirty observations were recorded. Before each walk-round was conducted, weather and ground conditions were noted.

The data recording sheets report who performed each activity and where and when it was performed. In order to identify the location of each activity, corresponding numbers were placed on the map of the site and the data sheets. The site plan was described in terms of design elements. The characteristics of the participants

were identified in terms of age, sex, and group size (for sample of data sheets, see Appendix A).

For the purpose of analysis, the observed activities and the participants were later categorized with respect to the activity types, age group categories, and group size categories (as suggested by Coates and Sanoff¹). These are as follows:

Activity Types:

1. Passive Play (observing, talking, reading)
2. Active Play (scuffling, gymnastic play)
3. General Play (exploring, camping, catching tadpoles)
4. Walking
5. Biking (with bicycles and/or tricycles)
6. Work (hanging washing, repairing car, sweeping)
7. Object Play (sticks, knives, jump rope)
8. Basketball
9. Ball Play
10. Horseshoes

If objects played a dominant role in the activity, then the activity was defined in terms of the object. If an object was used but was not dominant, the activity type was identified and the object used was noted.

Age Group Categories:

Infant	(2 years and under)
Pre-school	(3 years to 5 years)
Young Child	(6 years to 9 years)
Adolescent	(10 years to 13 years)
Teenager	(14 years to 18 years)
Adult	(19 years and over)

Group size categories were defined as: one person; two to three persons; four to six persons; seven to twelve persons; and thirteen or more persons.

Since group activity imposes certain restrictions on an individual's behavior, the activity was described in terms of the group activity which was then the unit of analysis.

In order to assess the observer's error, two observers conducted a walk-round at the same time and independently recorded the outdoor activities and the characteristics of the participants. The agreement between the recorded observations was as follows: observed activities 90%, estimated age group 79% and sex 88%. (See Appendix B).

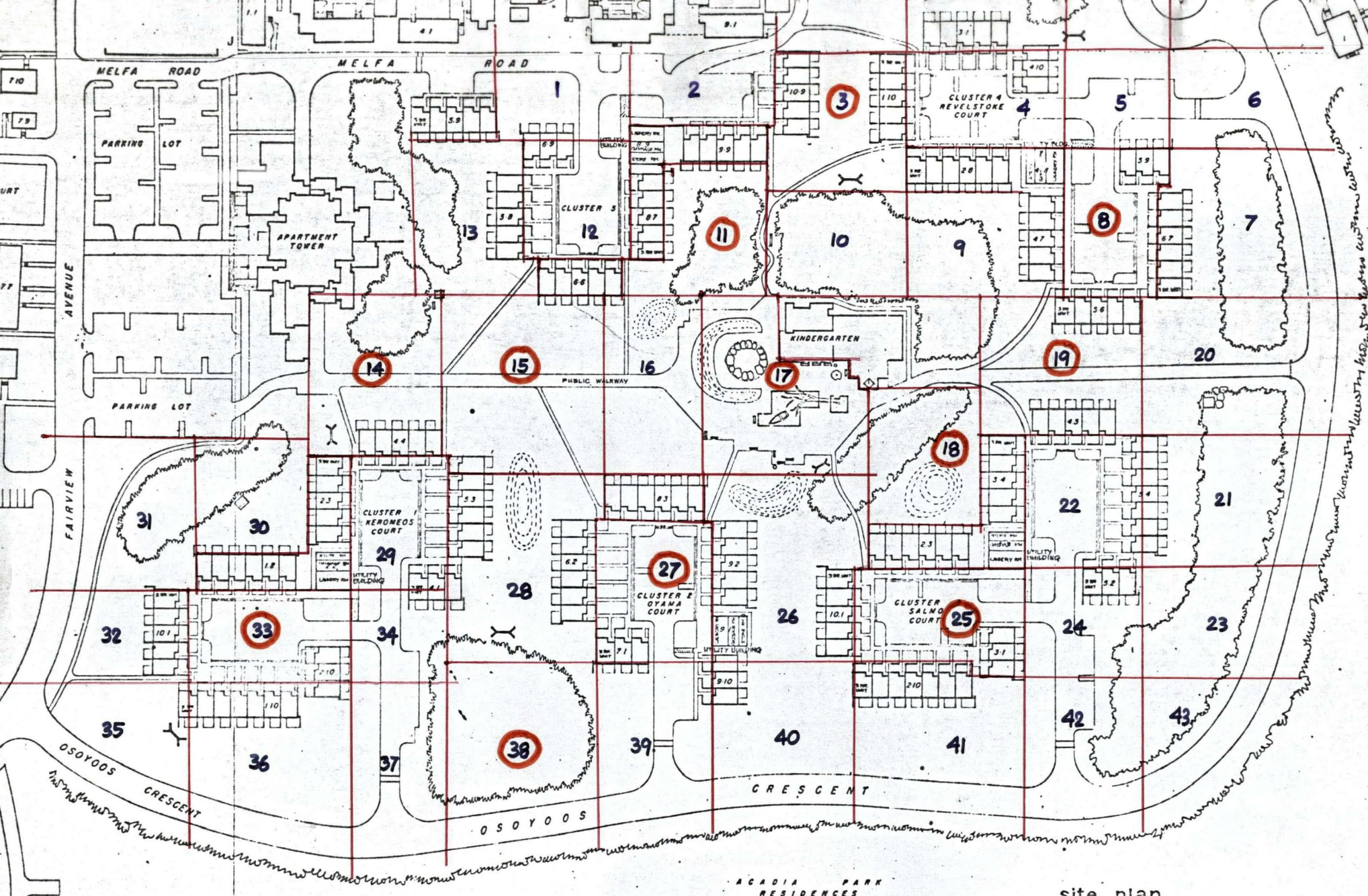


FIGURE 23

A RANDOM SAMPLE OF SIZE TWELVE SEGMENTS
AS SHOWN BY NUMBERED COLOUR CIRCLES



site plan
ACADIA PARK UCC
married graduate student residences

SCALE IN FEET

0 50 100 200

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1. Coates, Gary, & Sanoff, Henry. "Behavioral Mapping: The Ecology of Child Behavior in a Planned Residential Setting."
Environmental Design Research Association:
Proceedings of the Annual Conference.
1972. Vol. 1, pp. 13-2-2 to 13-2-3.

CHAPTER V

RESULTS:

This chapter has been divided into two parts - A and B.

Part A is a general over-view of the characteristics of the observed population and their activities by age, group size and sex.

Part B is a methodical discussion of all design elements in terms of expected behavior and unexpected behavior as suggested in Chapter I.

PART A

Description of the Observed Population

On the whole 1717 persons were observed in 888 groups. This means that the author noticed on the average $\frac{1717}{888}$ or 2 persons per group. Based on the total number of people observed over the period of thirty (30) observations, the author recorded on the average 57 people outdoors per observation in a random sample of segments. Twelve segments randomly selected from 31 segments were looked at; and these excluded all grassy areas near houses except those having swings, wooded areas and public walkways.

Table 1 shows that on the average 2.4 groups per segment per observation were seen with a standard deviation of 1.26 and coefficient of variation $\frac{1.26}{2.4} \times 100 = 52.5\%$. This implies that some of the means are almost zero while others may be as high as five or more. The randomly selected sample of 12 segments was composed of a higher proportion of some types of design elements than was suggested by the relative frequency of occurrence of those elements among

the total number of segments. As these 12 segments were more frequently occupied than the others, it was therefore assumed that on the average, say, 2 groups per segment per observation would be noticed. This means that among the $(31-12) = 19$ segments not looked at, there were also about 2 groups per segment. If there are 31 segments (excluding grassy areas near houses) in the community and on the average 700 people (350 children, 350 adults) living in the development, it would mean that about $(2 \times 2 \times 31) = 124$ persons outdoors in this settlement would have been observed at any given time on any given day. This would represent 18% of the total population within the Acadia Park Clusters, University of British Columbia.

Table 2 indicates that of 57 persons on the average noted outdoors, 3 of every 4 persons were children (children 74%; adults 26%). It shows that of 57 persons, 42 were children and 15 were adults.

Table 3 shows that of 1272 children observed in the selected segments, a large majority of them (85%) (i.e. 5 of every 6 children outdoors) were estimated to be 9 years or under. The most frequent age group observed outdoors was the pre-school children between 3 to 5 years of age (56%). The distribution among other age groups was 16% infants (2 and under),

13.0% young children (6-9), 12% adolescents (10-13), and 2% teenagers (14-18). These findings suggest that the majority of the population in Acadia Park Clusters is comprised of young parents. Middle-aged parents with children older than ten years of age form a very low percentage of the residents.

Based on the total number of people observed, a very small difference between the percentage of males and females was recorded (see Table 4). The category 'Unaccounted' used in Table 4 is an account of those children who were primarily observed in strollers or those whose sex was unassessable because of their way of dress. It will be noticed from Table 4A that almost 60% of the children observed outdoors were boys. This remained consistent for each of the five age groups of children. As expected, it was noted that the pattern in the case of adults was the reverse of children, i.e. 60% female and 40% male populations were recorded outdoors.

Types of Outdoor Activities

The activities of people observed during the walk-round (30 observations) were classified into a number of categories, as suggested by Coates and Sanoff (see Chapter IV). Generally the outdoor activities were

expected to be more active than passive but the findings partly dispelled this notion. Table 1 shows that of all the outdoor activities, walking was most frequently observed. If passive play (observing, talking and reading) were added to this, it would account for approximately half of the outdoor activities (walking 31% + passive play 19%). Bicycling and active play (scuffling, gymnastic play and running) accounted for 37% of the total activities which suggested that a low percentage of outdoor activities was comprised of active play (biking 25% + active play 12% = 37%).

The distribution among other activities was as follows: 6% object play (sticks, jump rope, playing with wheeled toys, etc.), 4% general play (exploring, camping), 2% work activities (repairing car or bicycle, repairing furniture, sweeping), 1% hockey game and 1% ball play.

Description of Activities by Age, Group Size, and Sex

From an analysis of activity types by age and group size, Tables 5 and 6 show that of all activity types, pre-school children most frequently engaged themselves in passive play, bicycling and walking. They also participated frequently in active play, object play, and

general play. While engaged in bicycling, walking and object play, they were observed in groups of 1 to 3 persons, whereas in passive play, active play and general play they were in groups of 2 to 6 persons. More than two-thirds (68%) of the activities of children aged 2 years and under account for passive play and walking (passive play 34%, walking 34%). Less than one-third of their activities was comprised of bicycling, active play, object play and general play. (See Table 5). The low percentage of general play, active play and object play confirms that the residential area lacks potential behavior settings for infants. As a result of this, their activities are confined to observing, talking, sitting and walking.

Almost one-third (34%) of the activities of the young children from 6 to 9 years of age consisted of bicycling in groups of 1 to 3 persons; and a little more than one-third (37%) participated in passive play and active play mainly in groups of 2 to 6 persons. The very low percentage of object play, general play and hockey suggests that the residential settings do not provide enough opportunity for this age group to participate in these activities. Table 5 shows that adolescents (10-13) do play hockey games; this accounts for one-seventh (14%) of the total number of all types of activities. This game is played principally in the

parking lots, as there is no other suitable space designed in the Acadia Park Clusters where children from 6 to 13 years of age could play hockey. Of all the activities, the most dominant activities of adults (19 and over) were walking and passive play (talking, observing, sitting and reading) carried out in groups of 1 to 3 persons. (See Tables 5 and 6).

Looking at the observations by group size, some of the activities such as bicycling and walking were mainly solitary. Groups of 2 to 3 persons predominated in active play, ball play, passive play, object play and general play. The exception was observed in the case of general play and ball play. Table 6 indicates that these activities are conducted in larger groups.

Table 7 shows that bicycle riding, object play and ball play were typical activities of pre-school children (3-5) and were dominated by boys in the ratio of approximately 2 boys:1 girl. Hockey was mostly played by adolescents (61.7%) and young children (17.7%) and was completely dominated by boys (100.0%). This finding is quite surprising as on many occasions girls have been noticed playing ground hockey on the University campus.

Outdoor work activity in which adults were the prime participants was also dominated by males in the ratio of 2 males:1 female. In the remaining activity

types, no significant differences between male and female participation was evident.

TABLE 1: OBSERVED ACTIVITY TYPES IN GROUPS
AND OBSERVED NUMBER OF PEOPLE OVER
THE PERIOD OF THIRTY OBSERVATIONS

Activity Types	Frequency of Groups	Percentage	No. of People
Passive Play	167	18.8	378
Active Play	101	11.4	213
General Play	36	4.0	109
Walking	274	30.9	473
Biking	220	24.8	339
Work	19	2.2	36
Object Play	54	6.1	114
Ball Play	5	0.5	21
Hockey	11	1.2	34
Total	888	100.0	1717

Sample Size = 12 Segments

No. of Observations = 30

Average No. of Groups per Observation = $\frac{888}{30} = 29.6$

Average No. of People Observed per Observation $\frac{1717}{30} = 57$

Average No. of Groups per Segment per Observation $\frac{888}{12 \times 30} = 2.4$

Average No. of People in Each Group = $\frac{1717}{888} = 2$

TABLE 2: PERCENTAGE OF CHILDREN AND ADULTS
OBSERVED OVER THE PERIOD OF THIRTY
OBSERVATIONS

Category	Frequency	Percentage
Children (0 to 18)	1272	74.1
Adults (19 & Over)	445	25.9
Total	1717	100.0

TABLE 3: ESTIMATED AGE GROUPS OF CHILDREN OBSERVED
OVER THE PERIOD OF THIRTY OBSERVATIONS

Age Groups	Frequency	Percentage
Infant (2 & under)	206	16.2
Pre-school (3-5)	711	55.9
Young Child (6-9)	166	13.0
Adolescent (10-13)	151	11.9
Teenager (14-18)	38	3.0
Total	1272	100.0

TABLE 4: SEX OF PEOPLE OBSERVED OVER THE
PERIOD OF THIRTY OBSERVATIONS

Sex	Frequency	Percentage
Male	936	54.5
Female	751	43.7
Unaccounted (Generally Babies)	30	1.8
Total	1717	100.0

TABLE 4A: DISTRIBUTION OF SEX AMONG THE AGE GROUP
OBSERVED OVER THE PERIOD OF THIRTY
OBSERVATIONS

	Infant 2 & Under		Pre-School 3-5		Young Child 6-9		Adolescent 10-13		Teenager 14-18		Adult 19 & Over	
Sex	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%
Male	106	60.2	429	60.3	102	61.4	99	65.5	20	52.6	179	40.3
Female	70	39.8	282	39.7	64	38.6	52	34.5	18	47.4	266	59.7
Total	176	100.0	711	100.0	166	100.0	151	100.0	38	100.0	445	100.0

TABLE 5: OBSERVED ACTIVITIES BY AGE GROUPS OVER THE PERIOD OF THIRTY OBSERVATIONS

Activity Types	Infant 2 & Under		Pre-School 3-5		Young Child 6-9		Adolescent 10-13		Teenager 14-18		Adult 19 & Over	
	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%
Passive Play	69	33.5	146	20.6	36	21.7	27	17.9	1	2.6	99	22.2
Active Play	17	8.2	113	15.9	25	15.1	21	13.9	8	20.9	29	6.5
General Play	15	7.3	66	9.3	13	7.8	5	3.4	2	5.2	8	1.8
Walking	69	33.5	138	19.4	20	12.0	21	13.9	16	41.7	209	46.9
Biking	20	9.7	139	19.5	56	33.7	46	30.5	10	26.0	68	15.2
Work	0	-	11	1.5	3	1.8	1	0.6	-	-	21	4.7
Object Play	16	7.8	83	11.7	7	4.2	3	1.9	-	-	5	1.1
Ball Play	-	-	9	1.3	-	-	6	4.0	-	-	6	1.3
Hockey	-	-	6	0.8	6	3.7	21	13.9	1	2.6	-	-
Total	206	100.0	711	100.0	166	100.0	151	100.0	38	100.0	445	100.0

TABLE 6: OBSERVED ACTIVITIES BY GROUP SIZE OVER THE PERIOD OF THIRTY OBSERVATIONS

	Passive Play		Active Play		General Play		Walking		Biking		Work		Object Play		Ball Play		Hockey	
No. of Persons	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%
1	60	36.0	31	30.8	10	30.0	161	58.8	142	64.5	10	52.6	25	46.3	1	16.6	4	36.4
2-3	78	46.7	60	59.4	14	38.8	94	34.3	69	31.4	8	42.1	22	40.7	4	66.8	3	27.2
4-6	24	14.3	10	9.8	11	30.5	18	6.6	9	4.1	-		6	11.1	1	16.6	2	18.2
7-12	5	3.0	-		1	2.7	1	0.3	-		1	5.3	1	1.9	-		2	18.2
Total	167	100.0	101	100.0	36	100.0	274	100.0	220	100.0	19	100.0	54	100.0	6	100.0	11	100.0

TABLE 7: OBSERVED ACTIVITIES BY SEX OVER THE PERIOD OF THIRTY OBSERVATIONS

	Passive Play		Active Play		General Play		Walking		Biking		Work		Object Play		Ball Play		Hockey	
Sex Category	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%
Male	170	44.9	110	51.6	64	58.7	224	47.4	224	66.1	24	66.7	71	62.3	15	71.4	34	100.0
Female	202	53.4	101	47.5	44	40.4	230	48.6	113	33.3	12	33.3	43	37.7	6	28.6	0	0.0
Unaccounted (Mostly Babies)	6	1.7	2	0.9	1	0.9	19	4.0	2	0.6	-	-	-	-	-	-	-	-
Total	378	100.0	213	100.0	109	100.0	473	100.0	339	100.0	36	100.0	114	100.0	21	100.0	34	100.0

TABLE 8: OBSERVED GROUP SIZE OF VARIOUS ACTIVITY TYPES
OVER THE PERIOD OF THIRTY OBSERVATIONS

Group Size No. of Persons	Frequency	Percentage
1	444	50.0
2-3	352	39.7
4-6	81	9.1
7-12	11	1.2
13+	0	0.0
Total	888	100.0

PART B

Evaluation of Patterns

So far the discussion has been centered around the activities and characteristics of the population observed outdoors over the period of thirty observations. There still remains the question of how the outdoor design elements are used by the residents of the Acadia Park Clusters. The abstracted observable behavior (on which the design elements will be evaluated) relevant to the design elements are given in Chapter III. It was with these expected behaviors in mind that the observations of the outdoor design elements of the Acadia Park Clusters were planned.

In order to evaluate if patterns are fulfilling the purpose for which they were designed, the following criteria are considered:

1. Does the expected behavior (K) occur at all in Design Element I?

$$K_I \quad 0$$

2. Does the expected behavior in Design Element I occur proportionately more than other unexpected behavior (M)?

$$\frac{K_I}{K_I + M_I} \quad \text{e.g.} \quad 0.5$$

3. Does a substantial proportion of the expected behavior (K) occur in Design Element I?

$$\frac{K_I}{K_{I-N}} \quad \text{e.g. } 0.2$$

4. Is the expected behavior (K), wherever it occurs, an important activity?

$$\frac{K_{I-N}}{K_{I-N} + M_{I-N}} \quad \text{e.g. } 0.10$$

5. Does the behavior in Design Element I, whether expected or otherwise, form a substantial part of all observed behaviors?

$$\frac{K_I + M_I}{K_{I-N} + M_{I-N}} \quad \text{e.g. } 0.05$$

The following are the results of the study:

Design Element 1: Clustering of Dwelling Units

Court Segment Nos. 8, 25, 27 and 33 were randomly selected as a sample for observation. These segments are similar in terms of design elements, i.e. a parking lot in the middle of the court, a raised sidewalk and grass around the parking lot connecting the parking lot to the raised sidewalk (18 inches above), an entry patio attached to each unit (which is directly connected to the raised sidewalk and grass around the parking area by an entry walkway), service facilities housing a laundry room and garbage room, and a few planters. However, Oyama Court (Segment 27) differs from the other three clusters in form and total number of dwelling units. (See Figure 23).

Expected Behavior:

- a. Different patterns of public behavior can be observed in courts which differ in size and shape.

Table 10 shows that all nine activity types were recorded in Court Segment 27, while at most, seven different activity types were noticed in Court Segments 8, 25 and 33. In spite of the observed variation in the frequency of groups among these segments, locomotion occupation (walking, biking) ranging from 47% to 58% accounts for about one-half (52%) of the total activities.

Passive play ranging from 23% to 32% is the next predominant activity noted in these segments. If locomotion occupation is added to passive play, they account for 81% of the activities.

Summary and Discussion:

The contention that different patterns of public behavior can be observed in courts which differ in size and shape is not completely supported. It was expected that the pattern of behavior in Court Segments 8, 25 and 33 [each of which encompasses 40 dwelling units (36 two-bedroom apartments and 4 three-bedroom apartments), two parking lots, a utility building, raised sidewalk and grass around the parking lots] would be different from Court Segment 27 [which includes only 23 dwelling units (22 two-bedroom apartments and 1 three-bedroom apartment), a parking lot, a utility building, raised sidewalk and grass around the parking lot] .

A difference in the total number of activity types was noticed among the court segments. This, the author believes, was due primarily to differences in the observed population distribution among the observed court segments (see Table 11); however, the predominant activities within all the observed court segments were walking, biking and passive play. This suggests that the

pattern of public behavior among the observed court segments was similar.

These results did not support Whyte's assertion that when clusters vary in terms of types and number of dwellings around the parking lots, different patterns of public behavior result. (See Chapter III).

In generalising from the above findings, one can say that when a specific number of identical dwelling units are arranged around specific design elements, it generates a unit of design. When these units are so arranged that there is minimum visual connection or overlapping effect between them, each functions as an independent unit. This produces a pattern of public behavior similar to the others, provided the characteristics of the population within each unit do not vary significantly.

Expected Behavior:

- b. There will be more activities within the courtyards than in the planned play areas on the site.

Table 9 shows that of all the observed segments the highest percentage, 16% ($\frac{145}{888} \times 100$) of all types of activity groups was observed in Segment 17 (community play area). On the average 11% of all types of activity groups were recorded in Court Segments 8, 25,

27 and 33. These courtyard areas collectively form about one-half of the total activities observed outdoors.

As can be seen from Table 10, five activity types were noticed in Segment 17 while in the above court segments practically all activity types were observed. The frequently recorded activities in Segment 17 were passive play, active play, general play, walking and biking whereas in the above-mentioned court segments passive play, walking and biking were frequently seen.

Table 1 shows that the observed activity groups were distributed among the above activity types as follows: passive play 167, active play 101, general play 36, walking 274 and Biking 220. In terms of the total groups observed in each activity type, the following are the percentages observed in Segment 17 and, in Court Segments 8, 25, 27 and 33. The percentages for the latter group are represented as an average.

	<u>Segment 17</u>	<u>Court Segments</u>
Passive Play	11% ($\frac{19}{167} \times 100$)	17% ($\frac{28}{167} \times 100$)
Active Play	34% ($\frac{35}{101} \times 100$)	4% ($\frac{4}{101} \times 100$)
General Play	53% ($\frac{19}{36} \times 100$)	3% ($\frac{1}{36} \times 100$)
Walking	11% ($\frac{31}{274} \times 100$)	12% ($\frac{33}{274} \times 100$)
Biking	18% ($\frac{40}{220} \times 100$)	10% ($\frac{20}{220} \times 100$)

It can also be seen from Table 11 that 318 persons were noticed in Segment 17 and, on the average, 177 persons in the court segments were noticed.

Table 11 shows that all age groups participated in Segment 17. In the court segments all age groups except teenagers were observed. In terms of the total number of children from 6 to 13 years of age observed outdoors, 21% ($\frac{66}{317} \times 100$) participated in Segment 17 and, on the average, 10% ($\frac{30}{317} \times 100$) in the court segments. Percentages in the case of children five years and under and adults observed outdoors were: children 19% ($\frac{175}{917} \times 100$) in Segment 17 and 11% ($\frac{100}{917} \times 100$) in the court segments; adults 13% ($\frac{67}{445} \times 100$) in Segment 17 and 10% ($\frac{46}{445} \times 100$) in the court segments.

Summary and Discussion:

The above results clearly show that the expected behavior is not supported as more activity groups and a higher number of persons were observed in Segment 17 (community play area) than within the courtyard (Court Segments 8, 25, 27 and 33).

Active play and general play predominated in Segment 17 whereas they were almost absent in the courtyard. This was mainly because play equipment such as sandboxes, a large dry tree, swings and a rock pit were

located in Segment 17 while no play equipment had been provided in the court segments. The percentages in Table 5 show that children three years and above frequently participated in active play while children nine years and under were observed engaged in general play.

The above results show that a higher percentage in the case of all age groups in Segment 17 was recorded than the court segments. These percentages suggest that children 6 to 18 years of age prefer the community play area (where play equipment is located) to the cluster courtyard since twice as many children of these age groups were observed in Segment 17 than the court segments.

Bicycling was observed twice as much in Segment 17 than in the court segments. The large asphalt surface in Segment 17 and the design elements, 'raised sidewalk and grass around the parking' and 'car parking area' in the court segments provided an opportunity for this activity. Tables 14 and 19 show that biking occurred only on the large asphalt surface in the community play area (Segment 17) whereas in the court segments it was mainly observed in the design elements 'raised sidewalk and grass around the parking' and 'car parking area'. It can be noted from Tables 15 and 20 that children 3 to 9

years of age were frequently observed on the large asphalt surface in Segment 17 while children 3 to 5 years of age were recorded frequently in the above design elements in the court segments. This suggests that the smaller children because of their limited mobility and parent-dependency prefer to ride their bicycles in the vicinity of their dwelling unit.

An almost equal percentage in the case of passive play and walking in Segment 17 and the court segments was recorded. Table 5 shows that except teenagers almost all the age groups participated equally in passive play; but of all the age groups, adults and infants were most frequently observed walking. In these age groups a higher percentage was observed in Segment 17 than the court segments. This indicates that parents bring their infants to play in the community play area. This could be due to the sandboxes which promote intensive general play among children five years and under. (See Tables 14 and 15).

The findings suggest that when play facilities are clustered outside the cluster courtyard, they will be frequently used by children of all age groups provided there is no traffic street separating this play area from the cluster courtyard.

Design Element 2: Raised Sidewalk and Grass Around
The Parking Area

The raised sidewalk and grass around the parking area occurred in Segments 8, 25, 27 and 33. Tables 19 and 20 show that in these segments all age groups were observed and that all activity types were recorded.

Expected Behavior:

- a. When teenagers and adults are seen, they will be frequently engaged in passive play, such as conversation and observation.

Table 20 shows that adults were seen in this design element. Teenagers were wholly absent in these court segments. This was probably due to the limited number of teenagers observed outdoors over the period of thirty observations in the selected sample of twelve segments. Table 3 shows that in terms of the total number of children observed outdoors, teenagers accounted for only 3% ($\frac{38}{1272} \times 100$) of the population.

It can be seen from Table 20 that adults accounted for one-quarter (0.21) of the observed population in these court segments. Of 445 adults who were observed in the selected sample of twelve segments over the period of thirty observations, 22% ($\frac{96}{445} \times 100$) were noticed in this design element.

Table 19 shows that passive play (mostly talking, observing and sitting) was frequently recorded on the raised sidewalk and grass around the parking area. It accounted for more than one-quarter (0.27) of the total observed activities in this design element.

Table 10 shows that passive play was noticed in almost all the segments except Segment 15 which includes a central public walkway and public sidewalks as design elements. Passive play was recorded frequently in Segments 8, 17, 25, 27 and 33. In terms of all age groups engaged in this activity type in these segments, 53% ($\frac{69}{131} \times 100$) of passive play was observed on the raised sidewalk and grass around the parking area.

Of the total 167 activity groups that were observed engaged in passive play in all the segments over the period of thirty observations, 41% ($\frac{69}{167} \times 100$) of groups engaged in this activity was recorded in this design element.

Summary and Discussion:

As can be seen from Table 11, adults were frequently observed in Segments 8, 14, 15, 17, 25, 27 and 33. The design element, 'raised sidewalk and grass around the parking area', occurred in Segments 8, 25, 27 and 33. The common design element in Segments 14, 15 and 17 where

adults were also frequently observed was the central public walkway. Table 10 shows that of all the observed activity types in Segments 14, 15 and 17, walking and biking were most frequently observed. This suggests that adults were seen in these segments in migratory capacity.

The results have shown that passive play was frequently observed in Segments 8, 17, 25, 27 and 33. All these segments except Segment 17 (community play area) include the design element, 'raised sidewalk and grass around the parking area'.

The high percentage of observed adults and the activity, 'passive play' in this design element suggests that the expected behavior is supported in the case of adults.

These observations suggest that the design element, 'raised sidewalk and grass around the parking area', located in front of the dwelling units is conducive to passive play (conversing, observing and sitting).

Expected Behavior:

- b. When small children five years and under are observed, they will be seen cycling, running with or without a ball, or playing with their wheeled toys.

Table 20 shows that children five years and under were seen on the raised sidewalk and grass around

the parking area. They accounted for about three-fifths (0.59) of the total observed population in this design element.

In total 917 children five years and under were observed in the selected segments over the period of thirty observations. (See Table 3). Of 917 children, 29% ($\frac{266}{917} \times 100$) were observed in this design element.

As can be seen from Table 19, bicycling, object play and active play were noticed on the raised sidewalk and grass around the parking area. Bicycling accounted for about one-quarter (0.24) of all the observed activities in this design element. A low proportion was observed in the case of object play and active play.

In terms of the total activity groups that were observed in each of these activity types, (i.e. biking, object play and active play) in the selected sample of twelve segments over the period of thirty observations, 29% ($\frac{63}{220} \times 100$) of biking, 39% ($\frac{21}{54} \times 100$) of object play, and 12% ($\frac{12}{101} \times 100$) of active play was recorded in this design element. The reason for observing a low percentage in active play was that play equipment which could stimulate active play was not located in Court Segments 8, 25, 27 and 33.

Summary and Discussion:

It can be seen from Table 11 that children five years and under were frequently observed in Court Segments 8, 25, 27 and 33. In these court segments was located the design element, 'raised sidewalk and grass around the parking'.

Table 10 has indicated that biking was frequently observed either in Court Segments 8, 25, 27 and 33 or in Segments 14, 15 and 17. The central public walkway was the common design element in Segments 14, 15 and 17. The common design feature in the above seven segments was the hard surface either asphalt or paved. This finding reveals that the hard surface provides children five years and under with cues for biking.

Object play was frequently noticed in Segments 3, 8, 15, 25, 27 and 33. Other than the court segments, object play was frequently noticed in Segments 3 and 15. Segment 3 includes a public sidewalk and Segment 15 the central public walkway. This result once again shows that hard surface was perhaps the design feature which stimulated object play among small children. The record indicates that object play, when observed, usually consisted of pushing a go-cart with or without a person in it, playing with wheeled toys of various kinds, or walking with a stick, etc.

Active play was observed in Segments 3, 17 and 18 where either play equipment was installed or a wooded area was in close proximity. The reason for observing a low percentage of active play in court segments is mainly because no play equipment or woods were located there.

Table 5 shows that of 917 children five years and under who were observed outdoors, 14% ($\frac{130}{917} \times 100$) of children in this category participated in active play. Table 10 indicates that of all the segments, active play was most frequently observed in Segment 17 (community play area). This was the only play area where a cluster of play facilities are installed.

These observations support the expected behavior in the case of bicycling.

A high percentage (39%) of object play was recorded in this design element but Table 1 shows that of 888 activity groups observed outdoors, only 6% ($\frac{54}{888} \times 100$) of groups were engaged in object play. This indicates that either object play is not a popular activity among children five years and under or this activity does not frequently occur outdoors.

The expected behavior in the case of active play is not supported mainly because no play

equipment or woods within the courtyards are located.

The results suggest that when no play equipment for children five years and under is provided in the cluster courtyard, hard surface in the form of asphalt or pavement should be provided. This will provide children five years and under an opportunity to ride their tricycles and play with their wheeled toys.

Design Element 3: Steps

Expected Behavior:

- a. The steps will occasionally function as a setting for baby watching and as gossip center.

The steps located on the periphery of the parking lot occurred in Court Segments 8, 25, 27 and 33. As can be seen from Table 19, steps promoted mainly passive play (talking, observing, sitting, etc.). Nine of the ten activity groups observed on steps were engaged in passive play.

Table 10 shows that passive play was frequently observed in Segments 8, 17, 25, 27 and 33.

In all 167 activity groups were observed outdoors engaged in passive play. (See Table 1). Of 167 groups, 5% ($\frac{9}{167} \times 100$) of passive play was noticed on the steps.

Table 20 shows that only children five years and under and adults participated in this setting. Children accounted for about three-fourths (0.74) of the population observed on steps.

Summary and Discussion:

Steps promoted passive play as expected. Table 19 shows that in these court segments passive play

was frequently recorded in the design elements, 'raised sidewalk and grass around the parking area' and 'entry patio'. In the court segments on the whole, 108 activity groups were observed engaged in passive play. Of the 108 groups, 9% ($\frac{9}{108} \times 100$) of the groups engaged in this activity type were observed in this design element.

Table 21 shows that passive play on steps mainly occurred in groups of 2 to 6 persons while activities in the design elements, 'raised sidewalk and grass around the parking area' and 'entry patio' were frequently recorded individually or in groups of 2 to 3 persons.

In this setting adults were seen in an approximate ratio of 3 children per adult. The record indicates that when children five years and under were playing or riding a bicycle in the parking lot, adults (females) were frequently noticed to be sitting on the steps supervising them. (See Tables 20 and 22). On one occasion a family was recorded enjoying morning coffee as they sat comfortably on the steps.

These findings support Whyte's statement that where driveways meet, they create a natural setting for baby watching and gossiping. These observations also support the study of Alexander, et al. that when there are

areas in public places which are slightly raised and accessible by steps, people naturally gravitate towards them as these areas provide a vantage point from where an action as a whole can be seen.

Design Element 4: Car Parking Area

The car parking area occurred in Court Segments 8, 25, 27 and 33. Table 18 shows that of all six outdoor design elements in the courtyard serving as settings for courtyard behavior, the parking area ranked second highest in the total frequency of activity groups. Of 390 activity groups observed in these court segments, 16% ($\frac{63}{390} \times 100$) of the groups were noticed in this design element.

Expected Behavior:

- a. A variety of activities such as, delivery-men delivering the goods, residents loading or unloading their commodities, residents washing and repairing their cars, conversation and discussion among men while they are working, and small children playing with their wheeled toys beside the adults will be frequently observed within the parking lots.

As can be seen from Tables 19 and 20, all age groups were observed and all activity types were recorded in this design element. Walking, biking, hockey and passive play frequently occurred in the parking lot. Walking accounted for more than one-third (0.35) of the total observed activities in this setting. One-half of the total activities of this setting were equally distributed among (i) bicycling, (ii) hockey play and (iii) passive play.

Object play and work form a fraction of all observed activities in the car parking area. They accounted for one-tenth (0.11) of the total observed activities in this design element. In terms of the total number of groups observed outdoors engaged in each activity type, 7% ($\frac{4}{54} \times 100$) of object play and 16% ($\frac{3}{19} \times 100$) of work were observed in the car parking area.

As can be seen from Table 20, children five years and under were seen in this setting. They accounted for about one-half (0.48) of the observed population in this design element. Of 917 children five years and under who were observed outdoors, 6% ($\frac{58}{917} \times 100$) of this age category were recorded in the car parking area.

Adults accounted for more than one-quarter (0.28) of the observed population in the parking area. Of the total 445 adults observed outdoors, 8% ($\frac{35}{445} \times 100$) of adults were seen in this setting.

Summary and Discussion:

The above results show that a variety of activities took place in the parking lot. The record shows that the delivery of milk, newspaper and goods were frequently recorded. On many occasions adults were noticed repairing their cars, unloading groceries, etc. A high percentage (16%) of observed activity type 'work' in this design element supports the preceding statement.

It can be seen from Table 5 that adults mainly participated in work activities.

Table 5 shows that of all the age groups, pre-school children from 3 to 5 years were most frequently engaged in bicycling. In all, 139 children of this age category participated in biking. Of 139 children, 35% ($\frac{48}{139} \times 100$) of pre-school children were seen in the parking area.

Table 1 shows that in all, 54 groups were observed outdoors engaged in object play. Of these 54 groups, 59% ($\frac{32}{54} \times 100$) of object play was recorded in the court segments. This 59% of object play was distributed among the courtyard design elements as follows:

- (i) 39% Raised sidewalk and grass around the parking area
- (ii) 9% Entry patio
- (iii) 7% Car parking area
- (iv) 4% In front of laundry facility.

This result clearly reveals that object play occurred mainly in the vicinity of the dwelling unit.

Table 5 shows that object play was primarily an activity of children five years and under.

These results suggest that when parents were engaged in work activities in the parking area,

small children 3 to 5 years of age were seen riding a bicycle or playing with their wheeled toys beside the adults.

Passive play, as stated previously, was recorded frequently in Segments 8, 17, 25, 27 and 33. These segments with the exception of Segment 17, were the court segments where the design element, 'car parking area' was located. Table 19 indicates that in these court segments passive play was frequently observed in the design elements, 'raised sidewalk and grass around the parking' and 'entry patio'. This means that passive play rarely occurred in the parking area.

The above results partially support the expected behavior. The exception arises because a low percentage of passive play (conversation and observation) was observed in the car parking area.

As can be seen from Table 10, hockey play occurred only in the parking area. Table 5 shows that children from 10 to 13 years of age mainly participated in this sport. This sport appears to be a dominant male interest as no female participant was recorded. (See Table 7).

This result suggests that when no space for hockey play is provided in the development, older

children will transpose parking lots into hockey rinks. The hard surface of the parking area seems to provide cues to children for this activity. On many occasions, the author has seen children playing hockey in the tennis court located nearby in the Acadia Camp.

The observations also suggest that when a parking lot is located within the cluster courtyard where diverse activities take place, small children 3 to 5 years of age will be observed playing with their wheeled toys.

The study conducted by Alexander, et al. revealed that any area which holds more than 8 cars is identified as a 'car dominated territory'. If such an area contains a large number of cars whereby the traffic becomes unpredictable, then it is considered dangerous for children. (See Chapter III).

Thus the author feels whenever a parking lot is designed within a cluster, it should not hold more than 8 cars in order to make a setting safer for small children.

Design Element 5: Laundry Facility

Expected Behavior:

- a. Small children can be noticed playing beside the laundry room while mothers are laundering clothes.

This design element occurred in Court Segments 8, 25, 27 and 33.

Table 20 shows that all age groups except teenagers were observed beside the laundry facility. Children five years and under were frequently seen there. They accounted for about one-half (0.44) of the observed population in this setting.

In all 917 children five years and under were recorded outdoors in the selected sample of twelve segments over the period of thirty observations. Of 917 children, 2% ($\frac{15}{917} \times 100$) of this age category was observed beside the laundry facility.

Adults were also frequently seen in this setting. They accounted for about one-half (0.47) of the observed population in this design element.

Table 19 shows that of all the activities observed beside the laundry facility, walking was most frequently noticed. Passive play, biking and object play were rarely observed. They accounted for more than

one-third (0.38) of the total observed activities in this setting.

Summary and Discussion:

Table 5 shows that children five years and under frequently engaged themselves in passive play, active play, general play, walking, biking and object play. This table also indicates that adults were frequently seen engaged in passive play and walking.

The record indicates that only women were noted carrying clothes to the laundry room. (See Table 20). This means that adults were mainly observed walking. A child was never seen accompanying his mother to this setting.

In terms of the total number of groups observed engaged in biking, passive play and object play in the court segments, 4% ($\frac{3}{80} \times 100$) of biking, 4% ($\frac{4}{108} \times 100$) of passive play and 6% ($\frac{2}{32} \times 100$) of object play were observed beside the laundry facility. The low percentages in these activity types suggest that of the six outdoor design elements in the court segments serving as settings for behavior, activities rarely occurred beside the laundry facility.

As can be seen from the above, a very low percentage of children five years and under were recorded

in this setting.

These results suggest just the opposite of what was expected.

Design Element 6A: Entry Patio

Expected Behavior:

- a. Since the entry patios are enclosed by high walls and lack natural continuum to activities within the house, children will not play there.

The entry patio occurred in Court Segments 8, 25, 27 and 33. Table 18 shows that of all the six outdoor design elements of the court segments serving as settings for courtyard behavior, the entry patio ranked third in the frequency of activity groups. Of the 390 activity groups observed in the court segments, only 32 groups, i.e. 8% were recorded in entry patios.

Tables 18 and 20 show that of 680 persons who were observed in these court segment settings, 40 persons, i.e. 6% ($\frac{40}{680} \times 100$) were noticed in the entry patios. Of all the estimated age groups, children five years and under and adults mainly participated in this setting. Children five years and under accounted for about one-half (0.49) of the observed population in the entry patio. (See Table 20).

In all, 917 children aged five years and under were recorded outdoors in the selected sample of segments over the period of thirty observations. Of the 917 children only a small fraction, i.e. 2% ($\frac{20}{917} \times 100$) of children five years and under were seen playing in the

entry patio. Adults who were also frequently observed in the entry patio accounted for approximately one-half (0.45) of the observed population in this design element.

In terms of the total number of adults observed in all the selected segments over the period of thirty observations, 4% ($\frac{18}{445} \times 100$) of adults were noticed in the entry patio.

Table 19 shows that passive play predominated in the entry patio. This accounted for about three-fifths (0.57) of the total observed activities. Passive play consisted mostly of activities such as: mothers sitting on chairs and talking, mothers taking their lunch while supervising children playing in the court, infant observing the happenings in the court while holding onto the gate of the patio, etc. Table 1 shows that in all 167 groups were observed engaged in passive play. Of these groups, 11% were engaged in passive play.

Work and object play accounted for one-third (0.34) of the total activities observed in the work and 54 groups in object play category. Of the 19 activity groups, 32% ($\frac{6}{19} \times 100$) of work and of the 54 groups, 10% ($\frac{5}{54} \times 100$) of object play were recorded in the entry patio.

Summary and Discussion:

The observation of Alexander, et al. revealed that patios which are enclosed with high walls become claustrophobic. The patios that lack natural continuum to activities in the house remain unused. Whyte's study also showed that small yards are not extensively used by the residents. (See Chapter III).

The above results show that a low percentage of children five years and under and adults was recorded in the entry patio. This, the author believes, was primarily due to the fact that the entry patio is a private space. Its use depends upon the need of the individual family.

It is interesting to note that the percentage of 'passive play', 'work' and 'object play' was high. Passive play consisted of activities that a family performs in their own private space.

Table 10 shows that work activities were frequently recorded in Segments 8, 18 and 27. Segments 8 and 27 were the court segments where the entry patio was located. Segment 18 includes a patio attached to the living room. Table 10 also indicates that object play frequently occurred in Segments 3, 8, 15, 25, 27 and 33. Again, Segments 8, 25, 27 and 33 are the court segments

where the entry patio was located, and Segment 3 includes a patio attached to the living room.

The record indicates that work activities included: repairing bicycle, fixing furniture, cleaning rug and taking out articles from the storage box which the residents of the unit have placed on the patio, etc. In object play, children five years and under were often noticed playing with their wheeled toys such as, dump trucks, go-carts, bicycles, etc.

Table 1 shows that a very low percentage of activity groups was observed engaged in work and object play. This suggests that work and object play are activities that residents perform near their dwelling units.

These findings suggest just the opposite of what was expected.

The results suggest that an entry patio regardless of its dimension, is a useful space for activities that a family cannot conveniently perform inside the house.

Design Element 6B: Patio Attached to the Living Room

Expected Behavior:

- b. Whenever this patio is used, it will be used for activities such as: sitting outside, gardening and raising plants, barbecuing, doing small domestic repair jobs, having parties, or keeping children in, etc.

The patio attached to the living room occurred in Segments 3, 11, 14, 18 and 19. The description of this design element is based on the data gathered in Segments 11 and 18 only.

Table 24 shows that passive play, work and object play were the only activity types observed in this patio. Passive play, if added to work, accounted for four-fifths (0.84) of the total activities observed in this setting. Passive play encompassed talking, sitting and reading; and work activities included gardening, carpentry and repairing bicycles.

Table 1 shows that in the selected sample of twelve segments over the period of thirty observations, 19 activity groups were observed engaged in work activities and 167 in passive play. Of the 19 groups, 26% ($\frac{5}{19} \times 100$) were engaged in work in this design element; and of the 167 groups, 3% ($\frac{5}{167} \times 100$) as passive play were noticed.

Table 25 shows that all age groups except

teenagers participated in this setting. Of the total population observed in Segments 11 and 18, 18% ($\frac{28}{155} \times 100$) of the people were seen in the patios attached to the living room.

Summary and Discussion:

The study of St. Francis Square done by Cooper revealed that patios attached to dwelling units are used for a variety of activities.

The above results show that the patio attached to the living room was used for activities such as: sitting, reading, gardening, carpentry and repairing bicycles. Although charcoal grills were noticed in the patios, barbecuing was not observed. This, the author believes, could be due to the fact that the observations were conducted between 4.30 p.m. to 5.15 p.m. This is perhaps not the time when families take their supper.

It has been noted from Table 10 that work as an activity frequently occurred in Segments 8 and 18. Both these segments include patios. In Segment 18 the design element, 'patio attached to living room', was located, whereas in Segment 8 the 'entry patio' occurred.

A low percentage of passive play shows that this design element was rarely used for the purpose of

sitting out. This could be attributed to the fact that the observations were conducted between September 30 to October 16. It is known that during this time of the year the weather becomes cooler.

These findings seem to support the expected behavior.

The results suggest that such a patio should be provided as it offers a family an opportunity for gardening, doing small domestic repair jobs, sitting or cooking, and eating out on the living room side of the house.

Design Element 7: Woods

Expected Behavior:

- a. Whenever wooded areas are explored, they will be explored mostly by the older children from 6 to 13 years of age who will be frequently observed engaged in adventurous activities such as: exploring, hunting, camping, climbing trees, constructing houses, or digging holes, etc.

The wooded area occurred in Segments 11, 18 and 38. Table 25 shows that all age groups participated in woods. Children 6 to 13 years of age accounted for more than one-third (0.37) of the total observed population in this design element.

Table 3 indicates that in the selected sample of twelve segments, 317 children aged 6 to 13 years were observed. Of 317 children, 11% ($\frac{36}{317} \times 100$) of children from 6 to 13 years participated in woods.

As can be seen from Table 25, active play and general play did occur in woods. Active play accounted for more than one-half (0.54) of the total activities recorded in this design element; and general play accounted for more than one-quarter (0.29).

In terms of the total activity groups observed in each activity type (active play and general play), 20% ($\frac{20}{101} \times 100$) of active play and 31% ($\frac{11}{36} \times 100$) of general play were observed in this design element.

Summary and Discussion:

As can be seen from the above, woods stimulated active and general play. Active play frequently consisted of gang games like hide-and-seek, climbing fallen trees or cut trees, cutting logs, etc. On many occasions children invented challenging games such as, riding a bike through a thickly wooded area. General play included mostly exploring wooded areas, searching for different kinds of grass, scratching earth around the tree roots, digging earth, etc. On occasions when a child saw an unfamiliar insect, he attracted the attention of all age groups.

As can be noted from Table 10, active play was frequently observed in Segments 17 and 18. A wooded area was located in Segment 18 while play equipment such as swings, a large dry tree and rock pit were present in Segment 17. General play was frequently recorded in Segments 17, 18 and 38. Again in Segments 18 and 38 wooded areas occurred, while sandboxes which were responsible for 53% ($\frac{19}{36} \times 100$) of the total general play were in Segment 17.

A high percentage of observed active play and general play indicates that woods are conducive to these activity types. The reason why children were not observed constructing 'houses' was due primarily to the

fact that no building material is supplied to them for this purpose.

The wooded area, as stated earlier, was located in Segments 11, 18 and 38. The examination of total frequency of active and general play in these segments reveals that the percentage in these activities decreases as the distance increases from the community play area. Table 28 shows that the wooded area located adjacent to the community play area promoted twice as much activity as the wooded area located in Segment 38 (between the clusters adjacent to the traffic street). (See Figure 23 for juxtaposition).

Table 11 shows that children 6 to 13 years of age were frequently observed in Segments 17, 25 and 27. Segment 17 is the community play area where various play equipments were installed, while Segments 25 and 27 were court segments. This suggests that children 6 to 13 years of age were comparatively less frequently attracted by woods than to the play equipments in the community play area.

Clare Cooper stated that the adventure playgrounds tend to attract and absorb the interest of more children than other playgrounds; and the prime users range from 5 to 17 years of age. She goes further to say that one of the most popular activities on all adventure

playgrounds is the construction of dens and houses.

In this respect the wooded areas in the Acadia Park Clusters are not functioning as an adventure playground. The author, during the period of observation, noted dens which he believes were constructed by parents. The author did not observe any activity in these dens.

These observations suggest that there is a difference between an adventure playground and the wooded area. A wooded area functions as an adventure playground only when an opportunity for construction is provided for children.

Design Element 8: Street

Expected Behavior:

- a. Other than cars, streets will be utilized mainly for bicycle riding and walking.

Table 24 shows that the predominant activities recorded in this setting were bicycling and walking. They accounted for about nine-tenths (0.89) of the total activities observed in this setting.

Table 10 shows that bicycling and walking were recorded in almost all the observed segments. Of the 494 activity groups that were engaged in walking and bicycling, a small fraction of it, i.e. 3% ($\frac{16}{494} \times 100$) were recorded on the street. In the randomly selected sample of twelve segments, this design element was located only in Segment 38.

It can be noticed from Table 1 that walking and bicycling are the important activities since they accounted for more than one-half (56%) of the total activity groups observed. Of the total 888 groups that were observed, only 18 groups, i.e. 2% ($\frac{18}{888} \times 100$) were recorded on streets.

Summary and Discussion:

The above results indicate that the dead-end

service street on the periphery of the development is rarely used by pedestrian and cyclists. In other words, the designer has achieved his purpose by locating a dead-end street on the periphery of the project. The author has noticed that the designer has not provided any pedestrian sidewalk along this street (Osoyoos Crescent). Either this is the reason why pedestrians do not use this street or the pedestrians prefer the central traffic-free public walkway.

On many occasions object play such as pulling a go-cart with or without a person in it or dragging a stick along the curb of the street was noticed.

Children were extremely cautious when playing on the street. They usually stopped their play and moved closer to the edge of the street as soon as they saw a vehicle approaching. Older children from 6 to 13 years of age of both sexes were noticed in this setting. (See Tables 25 and 26).

Of 1272 children who were observed in the selected segments over the period of thirty observations, only 8 children, i.e. $(\frac{8}{1272} \times 100) = 0.6\%$ were noticed playing on the street. This information further supports the notion that the design element, 'street', has achieved its purpose.

Design Element 9: Public Walkway

Expected Behavior:

- a. Both pedestrians and cyclists will be frequently observed on the public walkway to which are connected the sidewalks of the clusters.

Segments 15 and 19 in which the public walkway was located, were randomly selected for observation. These segments were very similar with regard to the major design element, the central pedestrian walkway, to which are connected the public sidewalks of the clusters. (See Figure 23).

Table 10 shows that of all the observed activities, the most dominant activities in Segments 15 and 19 were walking and biking which result in more than three-quarter (80%) of the total activities. In examining Table 10 closely, it indicates that Segment 19 (almost at the dead-end of the central pedestrian walkway) pre-dominated in walking (47%), but bicycling was frequently recorded in Segment 15 (biking 49%). The reason for the decrease in percentage of bicycle riding in Segment 19 could be that children avoid cycling toward a dead-end.

Table 1 shows that of all the activity groups, walking and biking were most frequently recorded. They accounted for more than one-half (56%) of the total observed activity groups.

Of the 494 activity groups observed engaged in walking and biking, 22% ($\frac{110}{494} \times 100$) of walking and biking were recorded in the observed segments (15 and 19). These activities were recorded in almost all the observed segments. (See Table 10).

Summary and Discussion:

The results indicate that the central public walkway designed to collect the pedestrian traffic through the site toward the university campus and shopping village is well used both by pedestrians and cyclists. It has been noticed that of all activity groups engaged in walking and biking, 22% were recorded in Segments 15 and 19.

As can be seen from Table 10, walking and biking were frequently seen in Segments 8, 14, 15, 17, 19, 25, 27 and 33. Segments 8, 25, 27 and 33 were the court segments where the design elements, 'raised sidewalk and grass around the parking' and 'car parking area' were located. In the remaining Segments 14, 15, 17 and 19 - the common design element was the central public walkway. In all the eight segments the common design feature was a hard surface. This result suggests that the hard surface is conducive to walking and biking.

Table 30 indicates that Segment 15 which

was located towards the University campus and the shopping village was used twice as much as Segment 19 located towards the dead-end street. This finding suggests that the physical arrangement of one design element to another substantially influences the intensity of use.

The author feels that the pedestrian routes on the site should be directional, i.e. lead to some important facility (s). If they are not designed this way, residents will rarely use them.

Design Element 10: Outdoor Play Area

In the randomly selected sample of segments, the outdoor play area was situated in Segments 3 and 14. These segments were similar with respect to the major design element, i.e. the play apparatus, 'swings'. These segments differed in one respect. Segment 14 included a central public walkway, but Segment 3 had a public sidewalk connecting the community play area and eventually the central public walkway. Swings were also located in Segment 17 (community play area).

Expected Behavior:

- a. When swings are used, small children will be observed using them.

Table 32 shows that swings (outdoor play area) were used by all age groups. Children five years and under were frequently observed on the swings. They accounted for more than one-half (0.52) of the observed population in this design element.

Table 15 indicates that in Segment 17 (where swings were also located) children five years and under also accounted for more than one-half (0.53) of the total population observed in this design element. Thus the total number of children five years and under observed using the swings were 46.

Table 3 shows that in all, 917 children five years and under were observed outdoors. Of 917 children, 5% ($\frac{46}{917} \times 100$) of children in this category were observed using the swings.

Summary and Discussion:

Tables 15 and 31 indicate that swings stimulated intensive active play. As can be seen from Table 5, in all, 130 children five years and under were engaged in active play. It has been indicated earlier that 46 children in this category were seen on swings. This means that of 130 children 33% ($\frac{46}{130} \times 100$) of children engaged in active play were observed in this design element. This finding reveals that children five years and under are the prime users of swings which supports the expected behavior.

It can be seen from Table 11, children of this age category (≤ 5) were frequently recorded in Segments 8, 17, 25, 27 and 33. With the exception of Segment 17, the segments are all court segments. Segment 17 was the only area where various kinds of play equipment were installed. Of these five segments, children five years and under were most frequently seen in Segment 17. This result suggests that these children like to engage themselves in active play. Play equipment such as swings,

a rock pit and a large dry tree seem to serve this need since these equipments mostly promoted active play. (See Table 14).

The design element, 'outdoor play area' (swings), as stated previously, was located in Segments 3, 14 and 17. The examination of total frequency of groups engaged in active play in these segments reveals that the percentage in this activity decreases as the distance increases from the community play area. As can be seen from Table 29, swings located in the community play area promoted more than twice the activity than the one located in Segment 14. (See Figure 23 for juxtaposition).

This finding is similar to that observed in the case of woods (see design element, 'woods').

From these results, one can say that the physical arrangement of one design element to another substantially influences the intensity of use.

Table 10 shows that active play was much more frequently observed in Segment 3 than 14. The reason for this could be due to the swings in Segment 3 which are located between residential clusters and are visually accessible to them; and as well they are adjacent to the public sidewalk which leads to the community play area. The swings in Segment 14 are situated at the corner of the cluster where they do not have any visual connection

with the cluster courtyard. This result suggests that the outdoor play area should be accessible to small children, both visually and physically as indicated by the study of the Canadian Environmental Sciences group. (See Chapter III).

Expected Behavior:

- b. Adults will be seen accompanying the small children to the area equipped with play apparatus since swings tend to be dangerous for children from 3 to 5 years of age.

Table 32 shows that adults (19 years and over) were frequently observed in this setting. They accounted for about one-third (0.31) of the total observed population in this setting. In Segment 17 (where swings were also located) adults accounted for about one-fifth (0.19) of the population recorded in this design element. In all, 16 adults were noticed in Segments 3, 14 and 17.

In terms of the total number of adults seen outdoors, 4% ($\frac{16}{445} \times 100$) of adults were observed in this design element.

Summary and Discussion:

It has been shown previously that swings were mainly used by children five years and under. In all, 46 children in this age category participated in this

design element. As can be seen from the above, 16 adults were recorded in this design element.

The record indicates that children five years and under were frequently accompanied by an adult who either waited and supervised the child while he was using the swing or returned to the clusters after giving him a push.

This finding suggests that children five years and under using swings were frequently supervised by an adult in the approximate ratio of 3 children per adult. This result supported the expected behavior.

Tables 14 and 31 show that swings stimulated intensive active play and occasionally passive play when an adult who accompanied a child would sit on the swing to bide the time while the child was swinging. It is possible that on occasions this behavior of adults might have prevented small children from using swings. This finding suggests that a bench adjacent to swings should be located where adults could sit while supervising their children.

Design Element 11: Sandbox

Expected Behavior:

- a. Small children aged five years and under engaged in general play will be noticed in sandboxes.

General play was observed in the sandbox and this design element was located only in Segment 17. As can be seen from Table 14, it was the only activity recorded in this setting. Mostly digging and shovelling sand with a plastic shovel into a bucket was noticed.

Table 1 shows that of all 888 observed activity groups, only 36, i.e. 4% were noticed engaged in general play. Of this 4%, half, i.e. $(\frac{19}{888} \times 100) = 2\%$ occurred in the sandboxes. This indicates that either general play is not an important activity or the residential area lacks settings which could promote this activity.

Table 15 shows that of all the age groups observed in this design element, children aged five years and under accounted for about four-fifths (0.85) of the participants.

Summary and Discussion:

The studies of White and Alexander, et al. have shown that small children like to play with sand,

earth, mud, etc. (See Chapter III). The above results also support their statement. The reason for observing a low percentage of general play is due to the fact that in the randomly selected sample of twelve segments, sandboxes were located only in Segment 17 (community play area). The community play area has been located in the center of the project. This makes it rather difficult for small children to approach this setting by themselves since they have limited mobility and are dependent on their parents. For example, Table 15 indicates that children playing in the sandboxes were supervised by adults in the approximate ratio of 7 children per adult.

It will be noticed from Table 13 that of the seven design elements located in Segment 17 serving as settings for behavior, sandboxes ranked second highest in the frequency of observed activity groups.

In contrast, Tables 10 and 11 show that in Court Segments 8, 25, 27 and 33 (where a higher percentage of children five years and under was observed) general play seldom occurred. This could possibly be due to the fact that sandboxes were not located within these court segments.

Table 5 shows that children five years and under frequently engaged themselves in activities such as: passive play, active play, walking and biking. The observed

frequencies of these activity types are higher than general play because the design elements which can promote these activities are present in most segments. Were sandboxes installed at the various cluster courtyards, the above five activity types might be more evenly distributed.

Now the question arises, will the installation of these sandboxes affect the community play area?

It has been stated previously that sandboxes ranked second highest in frequency of groups among all the design elements located in the community play area. (See Table 13). This shows that probably the sandboxes would be used less but the overall use of the community play area would still be maintained because of the seven design elements it incorporates.

These results suggest that the sandbox which stimulate general play among small children should be located within the courtyards. This will ease the burden on mothers having to carry small children to the community play area.

Design Element 12: Dry Tree

Expected Behavior:

- a. When the dry tree is used, children will be observed climbing upon it and jumping into the sandpit.

Of all seven outdoor design elements in Segment 17 (community play area) serving as settings, the large dry tree spanning the sandboxes ranked fourth in the total frequency of activity groups.

It was occupied more than one-half (0.51) of the time by children ten years and over, in groups of 2 to 6 persons. (See Tables 15 and 16).

This design element seems to suggest mostly active play (climbing upon and balancing), and occasionally passive play in which children of 10 to 18 years of age were recorded sitting on its branches reading comic strips. Table 14 shows that active play accounted for four-fifths (0.82) of the total activities observed in this setting. Although active play (climbing upon and balancing on the tree) was observed, jumping into the sandpit was not recorded once.

Table 1 shows that of the 888 activity groups that were observed, 101 activity groups (i.e. 12%) were engaged in active play. It has been noted from Table 5 that all the estimated age groups frequently

participated in active play. This suggests that to the residents of the Acadia Park Clusters active play is an important activity.

Active play dominated in Segments 3, 17 and 18 where either play equipment was in supply or wooded areas were present.

Summary and Discussion:

The large dry tree promoted active play among children, as expected. It accounted for

$(\frac{11}{101} \times 100) = 11\%$ of the total observed active play.

This design element was the only one of its kind in the selected sample of segments. It is interesting to note that of all the estimated age groups this design element more frequently suggested cues for appropriate behavior to the older children aged 10 years and onward than it did to small children.

This result suggests that its location within the community play area (located in the center of the project) is justified, and this design element has achieved its purpose.

Design Element 13: Rocks and Hillocks

Expected Behavior:

- a. Whenever rocks and hillocks are used, they will stimulate such activities as, climbing, or, walking, sitting, or rolling wheeled toys.

Tables 14, 15 and 16 show that the rock area and the mound around it invited active play (mostly climbing) and attracted pre-school children of both sexes, quite commonly in groups of 2 to 3 persons. Occasionally while supervising their children, adults were seen sitting or lying on the grassy mound.

Of 101 activity groups that were recorded engaged in active play, 6% ($\frac{6}{101} \times 100$) of this activity were seen on rocks.

Of the 888 activity groups observed in the selected sample of segments, only 9 groups, i.e. 1% was recorded in this setting.

Summary and Discussion:

Though rocks and hillocks are used as expected, the very low percentage ($\frac{9}{888} \times 100$) = 1% of observed activity groups suggests that children were not particularly drawn to this area.

The results have shown that this design element was mainly used by pre-school children aged 3 to 5 years. Table 15 shows that of 140 pre-school children who were observed in Segment 17 (community play area) only 12, i.e. $(\frac{12}{140} \times 100) = 9\%$ were seen using rocks and hillocks.

This finding suggests that this play equipment is poorly designed, and it has failed to achieve its purpose. The author feels that rearrangement of rocks within the rock pit might stimulate more activities.

Design Element 14: Outdoor Seat

Expected Behavior:

- a. Whenever a seat is occupied, the occupant will face toward the activity zone.

It is very interesting to note that during these observations the eleven seats (without backrests) located within the community play area were used only ten times. (See Table 13). On eight of the ten occasions, the occupant(s) who was(were) generally female, was(were) facing toward the activity area. However, on one occasion mothers who were busy talking were facing toward the grass area where their children were playing.

A seat adjacent to the sandbox was quite often occupied by mothers who were recorded supervising their children playing in the sandbox. It was also noticed that while supervising their children, mothers preferred to sit on the concrete curb of the sandbox or on the child's tricycle rather than make use of the seat situated at a distance from the play area.

Table 14 shows that in nine of the ten instances the seat, as expected, promoted passive play (mostly sitting, talking, and observing). Of the 888 activity groups observed, 167 groups (i.e. 19%) were engaged in passive play. This suggests that passive play

is an important activity. Of 167 groups engaged in passive play, a very small fraction, i.e. $(\frac{9}{167} \times 100) = 5\%$ was recorded on these eleven seats.

Table 10 shows that passive play was noticed in all the observed segments except Segment 15 in which a central public walkway (to which are connected the public sidewalks of the clusters) is the major design element. It also shows that two-thirds (67%) of the observed passive play occurred in the observed Court Segments 8, 25, 27 and 33.

Summary and Discussion:

As can be noticed in Figure 16, the central public walkway passing through the community play area separates the seats from the play equipment. Tables 14 and 15 show that this large asphalt surface was frequently used by adults and children (between three and nine years of age) for walking and bicycling. This was probably the reason why mothers were forced to stay closer to their children while they were playing in the sandbox. When children were playing in the sandbox adjacent to which is located a seat, mothers frequently occupied the seat. If children played in the next sandbox where there was no seat, mothers either sat on the child's tricycle or the concrete curb of the sandbox. The author believes that

this was perhaps the reason for observing a low percentage of passive play on seats.

These observations suggest that the seats in the community play area are not strategically located.

The results show that when two design elements which promote conflicting behavior overlap, it is essential that the geometrical arrangement of design elements should assist to prevent the conflict from occurring, otherwise a new tendency will develop.

The author feels that the seats in the community play area should be located adjacent to the play equipment and they should be placed in such a way as to look onto activity.

Design Element 15: Community Play Area

Expected Behavior:

- a. The community play area will attract residents of all age groups. When adults are accompanying the children in this area, they will be seen conversing (passive play) with other residents.

It can be seen from Table 9 that of all the observed segments, Segment 17 (community play area) has the highest frequency of observed activity groups. It is located in the center of the housing project adjacent to the kindergarten school which is operated by the Acadia Park Tenant Society. The community play area encompasses sandboxes, a large dry tree, a 10 ft. wooden boat within one of the sandboxes, a rock pit, benches without back-rests, a large asphalt area and swings. This was the only segment of its kind within the study area.

The predominant activities noted in this segment were walking, biking and active play. Walking and biking accounted for almost one-half (49%) of the total activities observed; and active play represents one-quarter (24%) of the total activities. (See Table 10).

Passive play (conversing, sitting and observing), as expected, was also frequently recorded in this play area. It accounted for 13% of the total observed activities in this segment (Table 10). Of the 167 groups

that were observed engaged in passive play, 19 groups (i.e. 11%) were recorded in this segment only; and of the total active play observed in the selected segments $(\frac{35}{101} \times 100) = 34\%$ alone were noticed in the community play area.

Table 11 shows that Segment 17 was a very popular area since the residents of all age groups frequented it. Tables 3 and 11 indicate that of all the estimated age groups observed outdoors, teenagers 14 to 18 years of age proportionately participated more frequently than any other age group [infant ($\frac{35}{206} = 0.17$), pre-school ($\frac{140}{711} = 0.20$), young child ($\frac{34}{166} = 0.21$), adolescents ($\frac{32}{151} = 0.21$), teenagers ($\frac{10}{38} = 0.26$)].

Of the total of 1717 persons observed outdoors, 318, i.e. 18%, alone were noticed in Segment 17 (community play area).

Summary and Discussion:

A high percentage (34%) of active play suggests that the community play area stimulated intensive active play. This is primarily due to the play equipment such as swings, a large dry tree, and a rock pit. Again, a high percentage (18%) of the total observed population was recorded in the community play area. This result supports its central location.

In brief, one can say that since the community play area represents the greatest single concentration of play facilities, it fulfils the intention of the designer as a "center" of activity for the project. The distribution of recorded activity groups and number of persons suggests a congruence between design and function.

TABLE 9: RELATIVE DISTRIBUTION OF ALL ACTIVITY TYPES
AND NUMBER OF PEOPLE AMONG THE SELECTED SEGMENTS
OBSERVED OVER THE PERIOD OF THIRTY OBSERVATIONS

Segment No.	Frequency in Groups	Percentage	No. of People
3	53	6.0	110
8	75	8.4	136
11	33	3.7	68
14	68	7.6	139
15	85	9.6	132
17	145	16.4	318
18	33	3.7	87
19	49	5.5	104
25	114	12.9	209
27	107	12.0	194
33	99	11.2	172
38	27	3.0	48
Total	888	100.0	1717

TABLE 10: SEGMENTS BY ACTIVITY TYPES OBSER

VED OVER THE PERIOD OF THIRTY OBSERVATIONS

Activity Types	Segment No. 3		Segment No. 8		Segment No. 11		Segment No. 14		Segment No. 15		Segment No. 17		Segment No. 18		Segment No. 19		Segment No. 25		Segment No. 27		Segment No. 33		Segment No. 38	
	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%
Passive Play	5	9.4	24	32.0	10	30.4	9	13.3	-		19	13.1	5	15.2	6	12.2	26	22.8	31	29.0	31	31.3	1	3.7
Active Play	13	24.5	4	5.3	7	21.2	6	8.6	4	4.7	35	24.1	12	36.4	3	6.1	5	4.4	2	1.9	7	7.1	3	11.1
General Play	-		-		2	6.0	-		-		19	13.1	4	12.1	2	4.1	-		1	0.9	3	3.0	5	18.5
Walking	11	20.8	25	33.4	8	24.3	29	42.7	33	38.8	31	21.4	6	18.2	23	47.0	36	31.6	34	31.8	31	31.3	7	26.0
Biking	13	24.5	12	16.0	2	6.0	22	32.4	42	49.4	40	27.6	-		12	24.5	25	21.9	28	26.1	15	15.2	9	33.3
Work	2	3.8	4	5.3	1	3.0	1	1.5	-		-		4	12.1	-		2	1.7	3	2.8	2	2.0	-	
Object Play	6	11.4	6	8.0	3	9.1	1	1.5	6	7.1	1		-		3	6.1	10	8.8	6	5.7	10	10.1	2	7.4
Ball Play	3	5.6	-		-		-		-		-		2	3.0	-		-		1	0.9	-		-	
Hockey	-		-		-		-		-		-		-		-		10	8.8	1	0.9	-		-	
Total	53	100.0	75	100.0	33	100.0	68	100.0	85	100.0	145	100.0	33	100.0	49	100.0	114	100.0	107	100.0	99	100.0	27	100.0

TABLE 11: SEGMENTS BY AGE GROUPS OBSERVED OVER THE PERIOD OF THIRTY OBSERVATIONS

Age Groups	Segment No. 3		Segment No. 8		Segment No. 11		Segment No. 14		Segment No. 15		Segment No. 17		Segment No. 18		Segment No. 19		Segment No. 25		Segment No. 27		Segment No. 33		Segment No. 38	
	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%
Infant (2 & Under)	11	10.0	21	15.5	7	10.3	27	19.5	6	4.5	35	11.0	5	5.7	18	17.3	25	11.9	28	14.5	22	12.8	1	2.1
Pre-school (3-5)	51	46.4	70	51.5	28	41.2	43	30.9	40	30.2	140	44.0	44	50.5	46	44.2	92	44.0	70	36.1	74	43.0	13	27.1
Young Child (6-9)	8	7.2	1	0.7	9	13.2	6	4.3	20	15.1	34	10.7	21	24.1	2	1.9	27	13.0	14	7.2	12	6.9	12	25.0
Adolescent (10-13)	12	10.9	1	0.7	5	7.3	4	2.9	8	6.0	32	10.1	4	4.6	12	11.6	24	11.5	38	19.6	5	3.0	6	12.5
Teenager (14-18)	3	2.7	-	-	2	3.0	10	7.2	7	5.3	10	3.1	0	-	2	1.9	3	1.4	-	-	1	0.5	-	-
Adult (19 & Over)	25	22.8	43	31.6	17	25.0	49	35.2	51	38.9	67	21.1	13	16.1	24	23.1	38	18.2	44	22.6	58	33.6	16	33.3
Total	110	100.0	136	100.0	68	100.0	139	100.0	132	100.0	318	100.0	87	100.0	104	100.0	209	100.0	194	100.0	172	100.0	48	100.0

TABLE 12: SEGMENTS BY GROUP SIZE OBSERVED OVER THE PERIOD OF THIRTY OBSERVATIONS

Group Size No. of Persons	Segment No. 3	Segment No. 8	Segment No. 11	Segment No. 14	Segment No. 15	Segment No. 17	Segment No. 18	Segment No. 19	Segment No. 25	Segment No. 27	Segment No. 33	Segment No. 38
	No. %	No. %	No. %	No. %	No. %	No. %	No. %	No. %	No. %	No. %	No. %	No. %
1	22 41.5	40 53.3	13 39.4	28 41.2	55 64.7	60 41.4	8 24.2	20 40.8	58 50.9	65 60.8	58 58.6	17 63.0
2-3	27 50.9	29 38.7	15 45.4	31 45.6	25 29.4	65 44.8	17 51.5	23 46.9	46 40.3	32 29.9	34 34.3	8 29.6
4-6	3 5.6	6 8.0	5 15.2	8 11.8	5 5.9	18 12.4	5 15.2	6 12.3	8 7.0	9 8.4	6 6.1	2 7.4
7-12	1 2.0	-	-	1 1.4	-	2 1.4	3 9.1	-	2 1.8	1 0.9	1 1.0	-
Total	53 100.0	75 100.0	33 100.0	68 100.0	85 100.0	145 100.0	33 100.0	49 100.0	114 100.0	107 100.0	99 100.0	27 100.0

TABLE 13: DISTRIBUTION OF ALL TYPES OF ACTIVITIES
IN GROUPS AND THE OBSERVED NUMBER OF
PEOPLE AMONG THE VARIOUS DESIGN ELEMENTS
IN THE COMMUNITY PLAY AREA(SEGMENT NO.17)

Design Element	Frequency in Groups	Percentage	No. of People	Percentage
Large Asphalt Surface	80	55.2	146	45.8
Sandboxes	19	13.1	64	20.1
Large Dry Tree	11	7.6	24	7.6
Seats	10	6.9	23	7.3
Rock Area	6	4.1	11	3.5
Mound around Rock Area	3	2.1	11	3.5
Play Equipment (Swings)	16	11.0	39	12.2
Total	145	100.0	318	100.0

Average No. of Persons Per Group = $\frac{318}{145}$ = 2

Average No. of Groups Per Observation = $\frac{145}{30}$ = 4.8

TABLE 14: OBSERVED DESIGN ELEMENTS IN THE COMMUNITY PLAY AREA BY ACTIVITY TYPES

	Large Asphalt Surface	Sand- boxes	Large Dry Tree	Seats	Rock Area	Mound Around Rock Area	Play Equipment (Swings)
Activity Types	No. Proportion	No. Proportion	No. Proportion	No. Proportion	No. Proportion	No. Proportion	No. Proportion
Passive Play	3 0.03	19 1.00	2 0.18	9 0.90	6 1.00	2 0.66	3 0.19
Active Play	5 0.06		9 0.82	1 0.10		1 0.34	13 0.81
General Play							
Walking	31 0.40						
Biking	40 0.50						
Work							
Object Play	1 0.01						
Ball Play							
Hockey							
Total	80 1.00	19 1.00	11 1.00	10 1.00	6 1.00	3 1.00	16 1.00

TABLE 15: OBSERVED DESIGNED ELEMENTS IN THE COMMUNITY PLAY AREA BY AGE GROUPS

	Large Asphalt Surface	Sand- boxes	Large Dry Tree	Seats	Rock Area	Mound Around Rock Area	Play Equipment (Swings)
Age Groups	No. Propor- tion	No. Propor- tion	No. Propor- tion	No. Propor- tion	No. Propor- tion	No. Propor- tion	No. Propor- tion
Infant (2 & Under)	14 0.09	11 0.17	2 0.08	6 0.26	-	-	2 0.05
Pre-school (3-5)	53 0.36	44 0.69	6 0.25	5 0.22	9 0.82	3 0.27	19 0.48
Young Child (6-9)	27 0.18	2 0.03	1 0.04	-	-	6 0.55	5 0.13
Adolescent (10-13)	13 0.09	-	8 0.34	-	-	-	5 0.13
Teenager (14-18)	5 0.03	-	4 0.17	-	-	-	1 0.02
Adult (19 & Over)	34 0.25	7 0.11	3 0.12	12 0.52	2 0.18	2 0.18	7 0.19
Total	146 1.00	64 1.00	24 1.00	23 1.00	11 1.00	11 1.00	39 1.00

TABLE 16: OBSERVED DESIGNED ELEMENTS IN THE COMMUNITY PLAY AREA BY GROUP SIZE

	Large Asphalt Surface	Sand- boxes	Large Dry Tree	Seats	Rock Area	Mound Around Rock Area	Play Equipment (Swings)
Group Size No. of Persons	No. Propor- tion	No. Propor- tion	No. Propor- tion	No. Propor- tion	No. Propor- tion	No. Propor- tion	No. Propor- tion
1	47 0.58	4 0.21	3 0.27	4 0.40	2 0.34	2 0.66	3 0.18
2-3	28 0.35	7 0.37	7 0.64	5 0.50	4 0.66	1 0.34	12 0.75
4-6	4 0.05	7 0.37	1 0.09	1 0.10	-	-	1 0.07
7-12	1 0.12	1 0.05	-	-	-	-	-
Total	80 1.00	19 1.00	11 1.00	10 1.00	6 1.00	3 1.00	16 1.00

TABLE 17: OBSERVED DESIGNED ELEMENTS IN THE COMMUNITY PLAY AREA BY THE
RELATIVE DISTRIBUTION OF SEX IN THE ESTIMATED AGE GROUPS

Age Groups	Sex	Large Asphalt Surface		Sand-boxes		Large Dry Tree		Seats		Rock Area		Mound Around Rock Area		Play Equipment (Swings)	
		No.	Proportion	No.	Proportion	No.	Proportion	No.	Proportion	No.	Proportion	No.	Proportion	No.	Proportion
Infant (2&Under)	Boys	7	0.77	8	0.80	1	0.50	1	0.34	-	-	-	-	2	1.00
	Girls	2	0.22	2	0.20	1	0.50	2	0.66	-	-	-	-	-	-
	Total	9		10		2		3		-	-	-	-	2	
Pre-school (3-5)	Boys	36	0.68	27	0.61	4	0.66	3	0.60	4	0.45	1	0.34	5	0.26
	Girls	17	0.32	17	0.39	2	0.34	2	0.40	5	0.55	2	0.66	14	0.74
	Total	53		44		6		5		9		3		19	
Young Child (6-9)	Boys	18	0.66	1	0.50	-	-	-	-	-	-	6	1.00	1	0.20
	Girls	9	0.34	1	0.50	1	1.00	-	-	-	-	-	-	4	0.80
	Total	27		2		1		-	-	-	-	6		5	
Adolescent (10-13)	Boys	4	0.31	-	-	4	0.50	-	-	-	-	-	-	2	0.40
	Girls	9	0.69	-	-	4	0.50	-	-	-	-	-	-	3	0.60
	Total	13		-	-	8		-	-	-	-	-	-	5	
Teenager (14-18)	Boys	1	0.20	-	-	4	1.00	-	-	-	-	-	-	1	1.00
	Girls	4	0.80	-	-	-	-	-	-	-	-	-	-	-	-
	Total	5		-	-	4		-	-	-	-	-	-	1	
Adult (19 & Over)	Males	16	0.47	-	-	-	-	1	0.08	1	0.50	-	-	3	0.42
	Fem.	18	0.53	7	1.99	3	1.00	11	0.92	1	0.50	2	1.00	4	0.57
	Total	34		7		3		12		2		2		7	

TABLE 18: DISTRIBUTION OF ALL TYPES OF ACTIVITIES IN GROUPS AND OBSERVED NUMBER OF PEOPLE AMONG THE VARIOUS DESIGN ELEMENTS IN THE CLUSTER COURTYARDS (SEGMENT NOS. 8, 25, 27 AND 33)

Design Element	Frequency in Groups	Percentage	No. of People	Percentage
Raised Sidewalk & Grass Around the Parking	258	66.2	450	66.1
Parking Lot	63	16.2	123	18.0
Entry Patio	32	8.2	40	5.8
Laundry Facility	24	6.2	34	5.0
Steps	10	2.5	30	4.7
Garbage Facility	3	0.7	3	0.4
Total	390	100.0	680	100.0

$$\text{Average No. of Persons Per Group} = \frac{680}{390} = 2$$

$$\text{Average No. of Groups Per Courtyard
Per Observation} = \frac{390}{30 \times 4} = 3.2$$

TABLE 19: OBSERVED DESIGN ELEMENTS IN THE CLUSTER
COURTYARDS BY ACTIVITY TYPES

	Raised Sidewalk & Grass Around the Parking		Parking Lot		Entry Patio		Laundry Facility		Steps		Garbage Facility	
Activity Types	No.	Proportion	No.	Proportion	No.	Proportion	No.	Proportion	No.	Proportion	No.	Proportion
Passive Play	69	0.27	8	0.12	18	0.57	4	0.17	9	0.90		
Active Play	12	0.04	3	0.05	2	0.06	1	0.04				
General Play	5	0.02										
Walking	84	0.32	22	0.35			14	0.58	1	0.10	3	1.00
Biking	63	0.24	13	0.20	1	0.03	3	0.12				
Work	2	0.01	3	0.05	6	0.19						
Object Play	21	0.08	4	0.06	5	0.15	2	0.09				
Ball Play	1	0.01										
Hockey	1	0.01	10	0.16								
Total	258	1.00	63	1.00	32	1.00	24	1.00	10	1.00	3	1.00

TABLE 20: OBSERVED DESIGN ELEMENTS IN THE CLUSTER
COURTYARDS BY AGE GROUPS

	Raised Sidewalk & Grass Around the Parking		Parking Lot		Entry Patio		Laundry Facility		Steps		Garbage Facility	
Age Groups	No.	Proportion	No.	Proportion	No.	Proportion	No.	Proportion	No.	Proportion	No.	Proportion
Infant (2 & Under)	59	0.13	10	0.09	5	0.12	7	0.20	6	0.21		
Pre-school (3-5)	207	0.46	48	0.39	15	0.37	8	0.24	16	0.53		
Young Child (6-9)	40	0.09	10	0.09	1	0.03	1	0.03				
Adolescent (10-13)	47	0.11	19	0.14			2	0.06				
Teenager (14-18)	1	0.00	1	0.01	1	0.03						
Adult (19 & Over)	96	0.21	35	0.28	18	0.45	16	0.47	8	0.26	3	1.00
Total	450	1.00	123	1.00	40	1.00	34	1.00	30	1.00	3	1.00

TABLE 21: OBSERVED DESIGN ELEMENTS IN THE CLUSTER
COURTYARDS BY GROUP SIZE

	Raised Sidewalk & Grass Around the Parking		Parking Lot		Entry Patio		Laundry Facility		Steps		Garbage Facility	
Group Size No. of Persons	No.	Proportion	No.	Proportion	No.	Proportion	No.	Proportion	No.	Proportion	No.	Proportion
1	142	0.56	30	0.48	16	0.50	18	0.75	1	0.10	3	1.00
2-3	94	0.37	26	0.41	13	0.40	6	0.25	6	0.60		
4-6	16	0.06	5	0.08	3	0.10			3	0.30		
7-12	2	0.01	2	0.03								
Total	254	1.00	63	1.00	32	1.00	24	1.00	10	1.00	3	1.00

TABLE 22: OBSERVED DESIGN ELEMENTS IN THE CLUSTER COURTYARDS BY THE
RELATIVE DISTRIBUTION OF SEX IN THE ESTIMATED AGE GROUP

		Raised Sidewalk & Grass Around the Parking		Parking Lot		Entry Patio		Laundry Facility		Steps		Garbage Facility	
	Sex	No.	Proportion	No.	Proportion	No.	Proportion	No.	Proportion	No.	Proportion	No.	Proportion
Infants (2 & Under)	Boys	23	0.43	7	0.70	4	0.80	3	0.43	4	0.66		
	Girls	31	0.57	3	0.30	1	0.20	4	0.57	2	0.34		
	Total	54		10		5		7		6			
Pre-school (3-5)	Boys	129	0.62	31	0.64	7	0.46	7	0.87	4	0.25		
	Girls	78	0.38	17	0.36	8	0.53	1	0.13	12	0.75		
	Total	207		48		15		8		16			
Young Child (6-9)	Boys	24	0.60	8	0.80			1	1.00				
	Girls	16	0.40	2	0.20	1	1.00						
	Total	40		10		1							
Adolescent (10-13)	Boys	31	0.66	19	1.00			2	1.00				
	Girls	16	0.34										
	Total	47		19				2					
Teenager (14-18)	Boys	1	1.00	1	1.00	1	1.00						
	Girls	-		-		-							
	Total	1		1		1							
Adult	Males	39	0.40	13	0.37	5	0.28			1	0.13	1	0.34
	Females	57	0.60	22	0.63	13	0.72	16	1.00	7	0.87	2	0.66
	Total	96		35		18		16		8		3	

TABLE 23: DISTRIBUTION OF ALL TYPES OF ACTIVITIES IN GROUPS AND OBSERVED NUMBER OF PEOPLE AMONG VARIOUS DESIGN ELEMENTS IN SEGMENT NOS. 11, 18 AND 38

Design Element	Frequency in Groups	Percentage	No. of People	Percentage
Woods	37	43.0	98	51.8
Public Open Space	19	22.1	40	21.2
Patios (Attached to Living Room)	12	14.0	28	14.8
Street	18	20.9	23	12.2
Total	86	100.0	189	100.0

$$\text{Average No. of Persons Per Group} = \frac{189}{86} = 2$$

$$\text{Average No. of Groups Per Observation Per Segment} = \frac{86}{30 \times 3} = 0.95$$

TABLE 24: OBSERVED DESIGN ELEMENTS BY ACTIVITY TYPES

Activity Types	Woods		Public Open Space		Patio (Attached to Living Room)		Street	
	No.	Proportion	No.	Proportion	No.	Proportion	No.	Proportion
Passive Play	5	0.14	5	0.26	5	0.42		
Active Play	20	0.54	2	0.11				
General Play	11	0.29						
Walking	1	0.03	10	0.53			7	0.39
Biking							9	0.50
Work					5	0.42		
Object Play			1	0.05	2	0.16	2	0.11
Ball Play			1	0.05				
Hockey								
Total	37	1.00	19	1.00	12	1.00	18	1.00

TABLE 25: OBSERVED DESIGN ELEMENTS BY AGE GROUPS

Age Groups	Woods		Public Open Space		Patio (Attached to Living Room)		Street	
	No.	Proportion	No.	Proportion	No.	Proportion	No.	Proportion
Infant (2 & Under)	4	0.04	4	0.10	3	0.10		
Pre-school (3-5)	52	0.53	17	0.43	8	0.29	4	0.17
Young Child (6-9)	27	0.28	5	0.12	6	0.22	2	0.09
Adolescent (10-13)	9	0.09	1	0.02	3	0.10	2	0.09
Teenager (14-18)	2	0.02						
Adult (19 & Over)	4	0.04	13	0.33	8	0.29	15	0.65
Total	98	1.00	40	1.00	28	1.00	23	1.00

TABLE 26: OBSERVED DESIGN ELEMENTS BY GROUP SIZE

Group Size No. of Persons	Woods		Public Open Space		Patio (Attached to Living Room)		Street	
	No.	Proportion	No.	Proportion	No.	Proportion	No.	Proportion
1	7	0.19	9	0.47	4	0.34	15	0.83
2-3	21	0.57	7	0.37	6	0.50	3	0.17
4-6	8	0.21	2	0.11	1	0.08		
7-12	1	0.03	1	0.05	1	0.08		
Total	37	1.00	19	1.00	12	1.00	18	1.00

TABLE 27: OBSERVED DESIGN ELEMENTS BY THE RELATIVE DISTRIBUTION OF SEX IN THE ESTIMATED AGE GROUPS

Age Groups	Sex	Woods		Public Open Space		Patio (Attached to Living Room)		Street	
		No.	Proportion	No.	Proportion	No.	Proportion	No.	Proportion
Infant (2 & Under)	Boys	3	0.75	4	1.00	1	0.34		
	Girls	1	0.25			2	0.66		
	Total	4		4		3			
Pre-school (3-5)	Boys	38	0.73	14	0.82	6	0.75	4	1.00
	Girls	14	0.27	3	0.18	2	0.25		
	Total	52		17		8		4	
Young Child (6-9)	Boys	16	0.60	2	0.40	5	0.83	1	0.50
	Girls	11	0.40	3	0.60	1	0.17	1	0.50
	Total	27		5		6		2	
Adolescent (10-13)	Boys	6	0.66			3	1.00	1	0.50
	Girls	3	0.34	1	1.00			1	0.50
	Total	9		1		3		2	
Teenager (14-18)	Boys	2	1.00						
	Girls	-							
	Total	2							
Adult (19 & Over)	Males	1	0.25	2	0.16	7	0.87	11	0.73
	Females	3	0.75	11	0.84	1	0.13	4	0.27
	Total	4		13		8		15	

TABLE 28: OBSERVED ACTIVE AND GENERAL PLAY
IN AREA DESIGNATED AS WOODS

Segment No.	Frequency in Groups	Proportion
11	9	0.27
18	16	0.49
38	8	0.24
<hr/>		
Total	33	1.00

TABLE 29: OBSERVED ACTIVE PLAY IN AREA DESIGNATED
AS PLAY APPARATUS 'SWINGS'

Segment No.	Frequency in Groups	Proportion
3	13	0.37
14	6	0.17
17	16	0.46
Total	35	1.00

TABLE 30: OBSERVED LOCOMOTION IN AREA
DESIGNATED AS PUBLIC WALKWAY

Segment No.	Frequency in Groups	Percentage
15	75	68.2
19	35	31.8
Total	110	100.0

TABLE 31: ACTIVITY TYPES IN OUTDOOR PLAY AREA (LOCATED
IN SEGMENTS 3 AND 14) OBSERVED OVER THE
PERIOD OF THIRTY OBSERVATIONS

Activity Types	Outdoor Play Area	
	No.	Proportion
Passive Play	1	0.08
Active Play	12	0.92
General Play		
Walking		
Biking		
Work		
Object Play		
Ball Play		
Hockey		
<hr/>		
Total	13	1.00

TABLE 32: ESTIMATED AGE GROUPS IN OUTDOOR PLAY AREA
(LOCATED IN SEGMENTS 3 AND 14) OBSERVED
OVER THE PERIOD OF THIRTY OBSERVATIONS

Age Groups	Outdoor Play Area	
	No.	Proportion
Infant (2 & Under)	6	0.21
Pre-School (3-5)	9	0.31
Young Child (6-9)	2	0.07
Adolescent (10-13)	1	0.03
Teenager (14-18)	2	0.07
Adults (19 & Over)	9	0.31
Total	29	1.00

S U M M A R Y O F R E S U L T S

<u>DESIGN ELEMENT</u>	<u>EXPECTED BEHAVIOR</u>	<u>RESULT</u>
1. Clustering of Dwelling Units	a) Different patterns of public behavior can be observed in courts which differ in size and shape.	Not Supported
	b) There will be more activities within the courtyards than in the planned play areas on the site.	Not Supported
2. Raised Sidewalk and Grass Around the Parking Area	a) When teenagers and adults are seen, they will be frequently engaged in passive play, such as conversation and observation.	Supported
	b) When children five years and under are observed, they will be seen cycling, running with or without a ball, or playing with their wheeled toys.	Partially Supported

<u>DESIGN ELEMENT</u>	<u>EXPECTED BEHAVIOR</u>	<u>RESULT</u>
3. Steps	a) The steps will occasionally function as a setting for baby watching and as gossip center.	Supported
4. Car Parking Areas	a) A variety of activities such as: delivery-men delivering the goods, residents loading or unloading their commodities, residents washing and repairing their cars, conversation and discussion among men while they are working, and the small children playing with their wheeled toys beside the adults, will be frequently observed within the parking lots.	Partially Supported
5. Laundry Facility	a) Small children can be noticed playing beside the laundry room while mothers are laundering clothes.	Not Supported

<u>DESIGN ELEMENT</u>	<u>EXPECTED BEHAVIOR</u>	<u>RESULT</u>
6A. Entry Patio	a) Since the entry patios are enclosed by high walls and lack natural continuum to activities within the house, children will not play there.	Not Supported
6B. Patio Attached to the Living Room	b) Whenever this patio is used, it will be used for activities such as: sitting outside, gardening and raising plants, barbecuing, doing small domestic repair jobs, having parties, or keeping children in, etc.	Supported
7. Woods	a) Whenever woods are explored, they will be explored mostly by the older children from 6 to 13 years of age who will be frequently observed engaged in adventurous activities such as: exploring, hunting, camping, climbing trees, constructing houses, digging holes, etc.	Supported

<u>DESIGN ELEMENT</u>	<u>EXPECTED BEHAVIOR</u>	<u>RESULT</u>
8. Street	a) Other than cars, streets will be utilized mainly for bicycle riding and walking.	Supported
9. Public Walkway	a) Both pedestrian and cyclists will be frequently observed on the public walkway to which are connected the sidewalks of the clusters.	Supported
10. Outdoor Play Areas	a) When swings are used, small children will be observed using them.	Supported
	b) Adults will be seen accompanying the small children to the area equipped with play apparatus since swings, see-saws, etc. tend to be dangerous for children from 3 to 6 years of age, as shown in the study by Canadian Environmental Sciences.	Supported

<u>DESIGN ELEMENT</u>	<u>EXPECTED BEHAVIOR</u>	<u>RESULT</u>
11. Sandbox	a) Small children five years and under engaged in general play will be noticed in the sandboxes.	Supported
12. Dry Tree	a) When the dry tree is used, children will be observed climbing upon it and jumping into the sand pit.	Supported
13. Rocks and	a) Whenever rocks and hillocks are used, they will stimulate such activities as, climbing, or, walking, sitting and rolling wheeled toys.	Not Supported
14. Outdoor Seat	a) Whenever a seat is occupied, the occupant will face toward the activity zone.	Not Supported
15. Community Play Area	a) This area will attract residents of all age groups. When adults are accompanying the children in this area, they will be seen conversing with other residents.	Supported

C H A P T E R VI

CONCLUSION:

Since this thesis is a single case study, its results cannot be considered conclusive. The results of the study supported the assumption made in Chapter I that when patterns are combined to form a cohesive whole, some patterns may fail to achieve the purpose for which they were designed.

On the whole fifteen out-of-house design elements of the Acadia Park Clusters, Married Student Housing, University of British Columbia were observed. Many of these appeared to fulfil the purpose for which they were designed. However, six design elements did not support the expected behavior and two partially supported the expected behavior. (See Summary - Chapter V).

The author wishes to point out that in this study out-of-house patterns were abstracted from the design elements and their relevant expected behaviors were abstracted from previous research studies. Since the patterns were not studied in relation to the design objectives, this makes it rather difficult to say whether patterns have achieved their desired purpose or not. The author believes that before any conclusion could be arrived

at, it is essential that buildings designed by the pattern language method (or the patterns designed by Christopher Alexander and his colleagues) should be evaluated on the basis of their expected behavior.

Even though some of the design elements did not support the expected behavior, the results suggest that pattern behavior forms an entity which can be used as a unit of design.

The observational technique utilized in this study proved to be a simple method of gathering a significant amount of data and from it I was able to obtain a useful feedback on the physical environment and the utility of the various design elements. It would further seem practicable to train project residents to document this type of information and make them part of the evaluation system, although this was not done in this case.

The above technique does not involve the participation of a large body of researchers. It can be conducted without interfering with the daily activities of the residents and with a minimum of research equipment. Thus, it offers an economical method of data collection.

The findings of this study suggest that the research technique utilized in data collection and analysis is applicable for the evaluation of patterns.

The time allotment per observation was very short. The author believes that if a time sampling technique is used, it may yield better results.

As stated previously in Chapter I, user needs are dependent upon factors such as: cultural background, stage in life cycle, family composition, personal values, socio-economic conditions, etc. In this study only one variable has been considered, i.e. age of the participants. The author feels that if other variables are considered they may provide very useful information.

The author believes in the usefulness of such studies. If continued, they can certainly provide information to designers, developers and administrators on which design decisions can be based.

The study has pointed out that the physical arrangement of one design element to another substantially influences their intensity of use, as can be seen in the case of the design elements, 7 and 10, 'woods' and 'outdoor play area' respectively. The study also points out that when two design elements overlap, new tendencies seem to develop, for example, see Design Element 14, 'outdoor seat'. This, in particular, could be an area of further research.

If many researchers would provide us with studies of this kind the accumulative results could be significant.

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APPENDIX A. Sample of Data Sheets

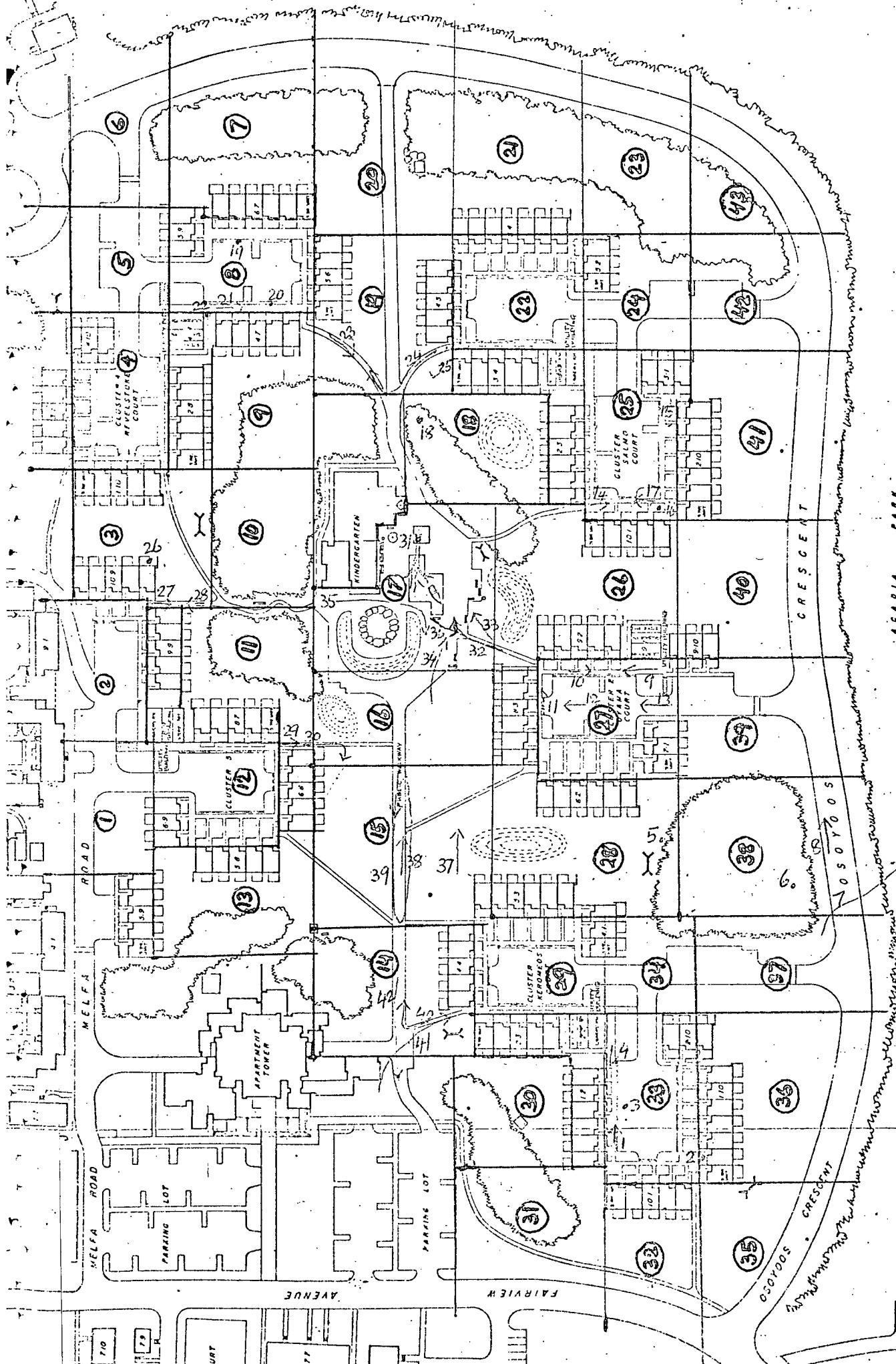
Reverse Round

Location: Acadia Park clusters
 Date: Oct. 4 Wednesday Time: 4:30 p.m. to 5:10
 Weather: Bright Sun (little wind) Ground Condition: dry
 Temperature 55 °F

Location NO	Activity	Age	Sex		Groupsize
			M	F	
✓1.	walking	14-18		1	1
✓2.	talking	[17+	3		
		6-9		1	4
✓3.	unloading grocery for car.	17+	1		1
✓4	delivering	19+	1		1
✓5.	digging mud	2	2		2
✓6.	cutting log.	6-9	2		2
7	walking across street	19+	1		1
8	walking	19+		1	1
✓9	walking	[10-13	2	3	6
		6-9		1	
✓10	riding tractor	3-5	1		1
✓11	cycling	3-5	1		1
✓12	walking	19+		1	1
✓13	cycling	19+		1	1
✓14	walking	3-5	1		1
✓15.	observing (walked & stopped)	3-5	1		1
✓16	talking.	[6-9		1	2
		29			
✓17	running and others walking	[19+	1	1	
		3-5			3

Location no	Activity	Age	Sex		Group size
			M	F	
✓18	Girls climbed the trees and sawing while the boy hid himself in the bushes.	3-5	1	2	3
✓19	Sitting on steps and talking to a girl in the p. lot.	3-5	1	4	5
✓20	Mother sitting on steps working and watching children	19+ 3-5		1	2
✓21	walking	19+ 2	1	1	2
✓22	observing	2		1	1
✓23	walking	19+	1		1
✓24	cycling	6-9	1		1
✓25	walking	2		1	1
✓26	hanging wash	19+		1	1
✓27	walking	14-18		1	1
✓28	cycling	19+	1		1
✓29	walking	3-5	1		1
✓30	walking	19+ 3-5	1	2	3
✓31	climbing the tree	3-5	1	1	2
✓32	walking	19+		1	1
✓33	"	19+		1	1
✓34	"	19+	1		1
✓35	cycling	6-9	1		1
✓36	"	6-9	1		1

Cotton No	Activity	Age	Sex		Group
			M	F	
✓37	Running searching for root	19+		1	1
✓38	walking	[19+		2	4
✓39	cycling (using as racing track)	3-5	2		
		6-9		4	4
✓40	cycling	3-5	1		1
✓41	walking	[6-9		1	2
		3-5		1	
✓42	cycling	[14-18	1		2
		10-13	1		



site plan

ACADIA PARK U20
married graduate student residences



SCALE IN FEET

ACADIA PARK
RESIDENCES

DATE: Oct. 4, Wednesday Time: 4:30 p.m. to 5:10 p.m.

APPENDIX B. Assessment of Observer's Error

In order to assess the observer's error, two observers conducted a walk-round at the same time and independently recorded the outdoor activities and the characteristics of the participants. The agreement between the recorded observations was as follows: observed activities 90%, estimated age group 79% and sex 88%.

OBSERVATION SHEET

Location: *Acacia lane cluster* Date: *Sept. 23/72* Time: *3:15 p.m.* Weather: *cloudy with sunny periods*

Location No.	Activity	Age	Sex M F	Group Size
1	✓ Biting	✓ 6-9		✓ 1
2	✓ Biting	3-5	✓ 1	
	✓ walking	3-5		✓ 1
3	✓ Running and jumping	✓ 3-5	✓ 1	
4	✓ walking	✓ 3-5	✓ 1	
5	✓ Biting	✓ 3-5		✓ 1
6	✓ Talking & playing with water paddle	✓ 3-5	✓ 2	
		✓ 6-9	✓ 1	
7.	✓ Adult on motor cycling, children and adults were observing	✓ 1920m	✓ 3	
		✓ 3-5	✓ 1	✓ 1
		✓ 6-9	✓ 3	
		✓ 6-9		✓ 2
8	✓ observing	✓ 3-5		✓ 1
9	✓ Riding bike and crying	3-5	✓ 1	
10	✓ Riding bike	✓ 10-13	✓ 1	
11	✓ walking and observing	✓ 1-2	✓ 1	
12	✓ Car drove off	✓ 1920m		✓ 1
13	✓ sitting on tractor	3-5	✓ 1	
14	✓ Riding a tractor and mother walking	✓ 3-5		✓ 1
		✓ 1920m		✓ 1
15	✓ Repairing car	✓ 1920m	✓ 1	
16	✓ Carrying goods into home	✓ 1920m	✓ 1	
17	✓ Riding bike	6-9	✓ 1	
18	✓ One biting, other walking	✓ 3-5		✓ 2
19	✓ Playing hockey	✓ 6-9	✓ 3	
	✓ observing	✓ 10-13	✓ 1	

OBSERVATION SHEET

Location:

Date:

Time:

Weather:

Location No.	Activity	Age	Sex		Group Size
			M	F	
20	✓ Sitting in the patio while bike is on the stand.	✓ 3-5	✓ 1		
21	✓ Exploring, one has pram	✓ 6-9		✓ 2	
22	Playing with doll	- 2		2 ✓	
23	✓ Loading car	✓ 19:00	✓ 1		
		✓ 3-5	✓ 1		
24	✓ unloading stuff	✓ 19:00	✓ 2		
25	✓ Mother walking with children (pram)	✓ 19:00		✓ 1	
		✓ 2		✓ 2	
		✓ 3-5	✓ 1		
26	✓ carrying goods in a box to car	✓ 6-9	✓ 1		
27	✓ Paving	✓ 10-13	2 ✓		

OBSERVATION SHEET

Location:

Date:

Time:

Weather:

Location No.	Activity	Age	Sex M F	Group Size
1	Cycling	7-8	✓	
2	Cycling, walking	4-5	✓ ✓	
3	Jumping, running	4-5	✓	
4	Walking	4-5	✓	
5	Cycling	3-4	✓	
6	Cycling, Water Puddle, Talking	4-6	✓ ✓	
7	Children looking at Motor Cyclist	6-7 Adults 6-7 6-7 3-4	✓ 3 3 ✓	✓ ✓ ✓ ✓
8	Child looking out	4-5	✓	
9	Crying and Cycling	4-5	✓	
10	Cycling	10-12	✓	
11	Looking out in Porch	1-2	✓	
12	Car driving out	Adult	✓	
13	Child on plastic toy	2-3	✓	
14	Mother and child going home (child riding tractor)	Adult 3-4	✓	✓
15	Car repairing in Parking lot	Adult	✓	
16	Taking furniture into house	Adult	✓	
17	Cycling	10-13	✓	
18	Cycling Walking	3-5 3-4	✓	✓ ✓
19	Hockey - Playing Looking on	6-10 10-12	3 1	
20	Biking in patio	3-6	✓	
21	Playing with man in woods	6-7	2	
22	Watching activity of father	2-3	2	

OBSERVATION SHEET

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Location:

Date:

Time:

Weather:

Location No.	Activity	Age	Sex M F	Group Size
23	Boy helping father to carry articles to car	3-5 Adult	✓ ✓	
24	Adults taking stuff from car into house	Adult	✓✓	
25	Mother pushing pram	Adult 3-4 1-2	 ✓ ✓ ✓✓	
26	Boy taking stuff to car	7	✓	
27	Talking while sitting on bicycles at corner	9-13	✓✓	