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A study of the space creating prinsciples in self built urban black residential environments

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A STUDY OF THE SPACE CREATING PRINCIPLES IN SELF-BUILT URBAN BLACK RESIDENTIAL ENVIRONMENTS.

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A discourse submitted to the Faculty of Architecture,
University of the Witwatersrand in partial fulfillment
of the requirements for the degree Master of Environmental
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FOREWORD

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A STUDY OF THE SPACE CREATING PRINCIPLES IN SELF-BUILT URBAN BLACK RESIDENTIAL ENVIRONMENTS

CHAPTER I
INTRODUCTION

The European origin of the White population group in South Africa has been expressed in the character of their cities. Although the totally different climate in South Africa calls for another approach, the indoor culture and lifestyles, as well as the cold climate built forms of Europe still shape the urban environments of especially the residential neighbourhoods in South Africa.

This European approach, towards forming the urban environment also became the major force to shape urban residential environments for the Black indigenous population groups of South Africa, which does not take cognisance of their lifestyles and cultural backgrounds that evolved under local conditions.

1. PROBLEM

The development of urban Black residential environments in South Africa has therefore evolved into a system where housing schemes are being imposed on people with no regard to their lifestyles, cultural patterns of life, or historical backgrounds.

The building of cities has rather become an expression of global technological and economic advancement.

> "Cities today tend to be visually confused. They are monotonous patterns of static elements. They lack visual and physical character, consonant with the function and technology which compose them. They also lack elasticity and flexibility." (Maki, 1964, p. 4.)

The problem in South Africa is that, with its rich variety of cultures and lifestyles, we lack an adequate visual expression of the lifestyles of these different cultures of peoples in our cities.

2. STATEMENT

The spatial structure and urban environment usually reflect the background and lifestyle of the people who live there, and therefore the living environment becomes an interaction of cultural pattern and historical background.



> "The human quality which determines form, has to do with the way of life, movement and relation of persons in society." (Maki, 1964, p. 21.)

The lifestyles of people and their historical backgrounds are usually reflected in the undesigned self-built urban residential environments where people have provided themselves with homes. In doing so, they have created spaces which are meaningful to their particular lifestyles. Over time, principles for the creation of urban environments, developed from these basic beginnings, which gave rise to the building of meaningful urban environments. Therefore, in the urban fabric, those principles which are important towards space-making in order to accommodate the lifestyles of people will be especially reflected in these self-made urban environments, since the development thereof are not constrained by controls of technological development, or the influences of external decision-making mechanisms, which characterise the imposed environment, built by one group of people for another group to live in.

In South Africa, with it's First- and Third world population groups, the latter group of people are being absorbed into the urban structures of the former group, which do not accommodate the lifestyle patterns of the latter group. These lifestyle patterns are still being expressed in the self-built residential environments which have distinctive characteristics that should be identified, understood and appreciated.

These self-built Black residential environments can thus be studied in order to:

1. Identify the basic physical principles and elements which reflect the lifestyles of the inhabitants and give form to the self-created urban residential environment.

2. Identify the extent to which the imposed residential environment recognises and/or is sympathetic towards those principles.

3. Determine whether those principles in the self-created urban residential environment can be applied to imposed residential environments.

The search, therefore, is to find in urban design an adequate spatial language with which space can be created and organised in a way that accommodates the traditional approach of the people who have organised spatial form, expressive of their lifestyles.

> "Our cities must change as social and economic use dictate, and yet they must not be temporary in the worst visual sense." (Maki, 1964, p. 4.)

The question is also, therefore, whether it is possible to design an urban environment which, in time, will represent the rapid-changing lifestyles and values of the urban Black people of South Africa, who, while adapting to Westernised lifestyles, nevertheless retain certain traditions which seek recognition and expression.

CHAPTER II
METHODOLOGY

The method to identify these self-built urban space-creating principles will be to carry out an analysis of a study area where both the imposed urban residential environment as well as the self-built urban residential environment have been developed in the same period of time for the people, and/or by the people themselves.

> "An urban society is characterised by :
>
> 1. Coexistence and conflict of amazingly heterogeneous institutions and invidivuals;
>
> 2. Unprecedented rapid and extensive transformations in the physical structure of the society;
>
> 3. Rapid communications methods; and
>
> 4. Technological progress and its impact upon regional cultures." (Maki, 1964, p. 3.)

Thus the physical spaces and appearance of the self-built environment in a situation not governed by technological development, should be representative of the people's expression and adaptation to change in their culture and lifestyles.

> "We are therefore involved in an investigation of the morphological resultants of forces present in cities." (Maki, 1964, p. 5.)

1. CHOICE OF STUDY AREA

Self-built urban environments frequently referred to as informal settlements, usually develop on the periphery of metropolitan areas in developing countries, such as South Africa. As a result of legislation relating to the political system, a typical example of this type of development occurred in the recent past approximately 30 kilometres north of Pretoria in the Winterveld area. The distance from the metropolitan periphery occurred partly as a result of present legislative systems and partly as a result of the area's proximity to employment in the northern extremity of the Pretoria metropolitan region.

With the movement towards the independence of the Republic of Bophuthatswana in 1976, urbanisation, especially of the Klippan area of the Winterveld Agricultural Holdings, accellerated during the seventies. The area developed as a self-built urban residential environment for commuters to the Pretoria metropolitan area as indicated on Plan 2.1.

Prior to, and directly after independence of the Republic Bophuthatswana, the South African government proceeded to develop the Mabopane area directly to the south of Klippan as indicated on Plan 2.1 in accordance with the Independence Agreement with the Republic of Bophuthatswana, so as to accommodate the overflow of Bophuthatswana residents from the metropolitan area of Pretoria.

The decision-making process which governed the development of the urban environment in the Winterveld Agricultural Holdings was, and still is, a laissez-faire system where the inhabitants create the spaces and determine the quality of the urban environment, as indicated on Plan 2.2

Mobopane is on the other hand, as indicated on Plan 2.3 a planned, built urban residential environment, directly south of Winterveld, and reflects the Western interpretation of the lifestyles of urban Blacks in South Africa. Mabopane is representative of the latest acceptable minimum level of advanced technological engineering infrastructure and housing standards, by the institutional framework of the government of the Republic of South Africa.

In the development of both Winterveld and Mabopane, the decision-making process was one-sided. The former was predominantly governed by the residents and the latter by the institutional framework of the government of South Africa.

The choice of study area in the Winterveld Agricultural Holdings was made with reference to a common criterion, that of Floor Area Ratio, (F.A.R.).

As indicated on Plans 2.2 and 2.3 an area of approximately 120 ha. was delineated in Mabopane as well as in Winterveld for study purposes. The Floor Area Ratio of the development in both these areas is the same. The population and housing unit densities are, however, different.

F.A.R. is an expression of built density, which shapes urban spaces, therefore this criterion was chosen as the basic common factor in the analysis of the urban spaces in both study areas.

According to the density in Mabopane, an area of 120 ha would represent a neighbourhood unit as expressed in the principles for neighbourhood development, where the high school forms the primary node for the neighbourhood. In this framework it represents approximately 1 800 to 2 000 housing units with a Floor Area Ratio of 0,13.

2. ANALYSIS

The method for analysing the space-creating principles in the self-built urban residential environment of Winterveld is governed by the following:

a. Physical Qualities.
b. Liveability Qualities.
c. Socio-spatial Qualities.

Mabopane will be studied to ascertain whether or not the principles, as derived from the procedure, mentioned above, are present in it's layout and development.

Alternatively, the space-making principles in the development of Mabopane can be extracted and analysed for their effect on the life-styles of the people.

As a measure of control a totally different self-built urban residential environment on the periphery of the Cape Town metropolitan area has been compared to the study area to ascertain that the principles are not subject to a particular situation only. This urban environment is Cross Roads, as indicated on Plan 2.5.

Contemporary urban design theories are then studied to ascertain their validity in the study areas of both Winterveld and Mabopane.

3. CONCLUSIONS

In conclusion a new set of design principles will be formulated based on those principles which facilitate the development of urban spaces representative of the cultural background and lifestyles of the people in Winterveld, but which also take cognisance of those principles built into Mabopane and which represent changes towards westernised lifestyles.

The validity of the introductory statement will be substantiated by applying these principles to a new area in close proximity to both study areas, which is purposefully designed to indicate the potential of these principles in a de novo situation.

4. APPLICATION

An area to the west of the Winterveld Agricultural Holdings, directly abutting both study areas has been chosen for the application of the set of design principles, since it would have been the natural area for urban expansion if cadastral boundaries had not constrained it. The area is north of Mabopane and has the same topographical features as both Mabopane and Winterveld.

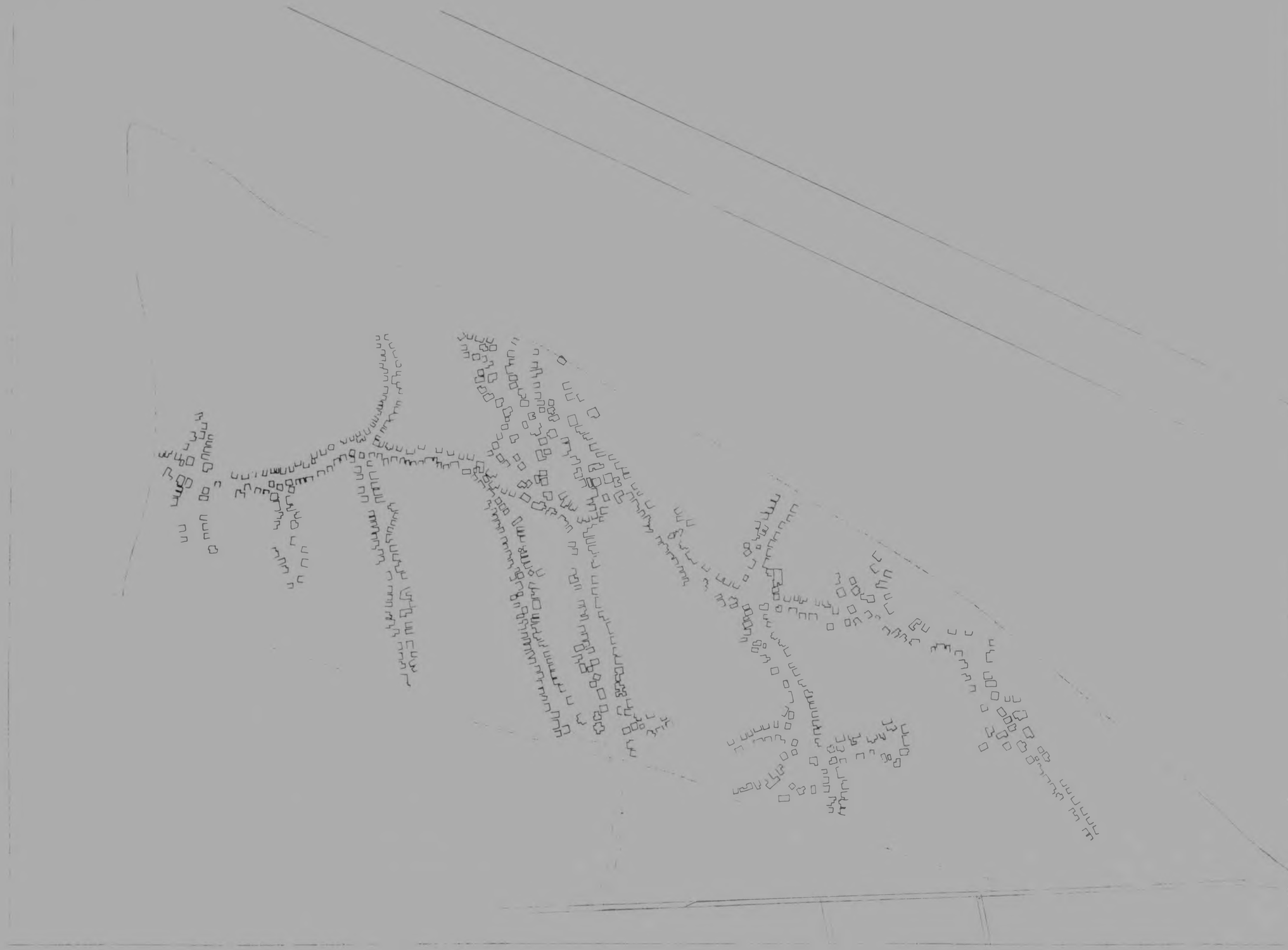
2.1


B
C
A
A WINTERVELD STUDY AREA
B MABOPANE STUDY AREA
C WINTERVELD 2
DESIGN AREA
LOCALITY PLAN



2.6

OVERALL STRUCTURE



CROSS ROADS

APPROXIMATE SCALE 100 0 100 200 300 400m

CHAPTER III
ANALYSIS

1. CONTEMPORARY SELF-BUILT SETTLEMENT PATTERN OF URBANISED BLACK PEOPLE

1.1 Historical review of the development of Winterveld Agricultural Holdings.

In the early forties the Winterveld Agricultural Holdings were cadastrally subdivided into some 1 658 five and ten morgen plots, designated for private ownership. Being situated approximately fifteen kilometres north of the northern municipal boundary of Pretoria North, the holdings were intended to be used as small agricultural units. A few of these holdings were thus originally sold to White small-holding farmers.[11]

Prior to the independence of the Republic of Bophuthatswana in 1976, most of these holdings were transferred to Black ownership.

With a view towards the independence of the national Black states, together with the administration of the Group Areas Act, the R.S.A. government declared that the Black urban residential areas in the Pretoria - and Witwatersrand metropolitan areas would not be further expanded. The overflow population in these areas would be accommodated in the Black national states as the policy of separate development was implemented.

Consequently the overflow population in the Black residential towns of the Pretoria metropolitan area, i.e. Mamelodi and Atteridgeville, as well as the other smaller Black residential townships has been accommodated, mainly in the Winterveld area, which falls outside the jurisdiction of the Pretoria Municipal Authority.

In this period of change, people who wished to reside in Winterveld were able to approach a plot owner in the area for permission to reside on his land. The plot owner would then allocate a specific location to the family and charge them a monthly rental for the right to reside on his property. Since then the influx of people has been controlled by a population survey which was lodged under control of the NBRI, in the Winterveld, to legalise the residency of inhabitants. This population survey was carried out in 1981 on the request of an intergovernmental committee on the development of Winterveld.[10]



Amary external communication link.



Secondary external communication link.

A fixed monthly rental is therefore paid for residential rights with no limitation on the size of the dwelling unit to be built. The people build their own houses, and thus create their own urban living and movement spaces and systems. Most of these people are commuters to employment centres in the Pretoria metropolitan area.

Thus Winterveld developed as a predominantly residential area for commuters.

The broad cadastral framework as indicated on Plan 3.1.3, which delineate the boundaries of each agricultural holding, became, and still is, the dominant space-making element in the urban fabric which developed on the Winterveld Agricultural Holdings. This framework :

i. serve to identify the physical and communication spaces and links from Winterveld to the outside world;

ii. serve as the framework within which the buildings on each holding were located within a delineated space; and

iii. demarcate the position of the physical connections between the external communication spaces and links as well as the spatial connections to the buildings.

Thus the broad cadastral framework guided the development of links and connections in Winterveld. It is within this broad framework that the people by themselves, have built their urban environment and created those spaces which are to be analysed in this study.

1.2 Principles for Urban Space Creation in the Winterveld Agricultural Holdings

1.2.1 Physical Qualities of the Urban Environment

i. Urban Grain

The system of allocating land to home builders on the various plots led to a process of rapid, but incremental growth and an irregular pattern of development. Despite the irregularity in the placement of buildings, there is an even density of development in Winterveld, which disperses slowly northwards. This is indicated on Plan 3.1.1.

Viewed at the scale of Winterveld as a whole, only the external communication links present clearly identifiable space-making elements as indicated on Plans



Primary internal connecting public space.



Secondary internal connecting public space.



Tertiary internal connecting public space.

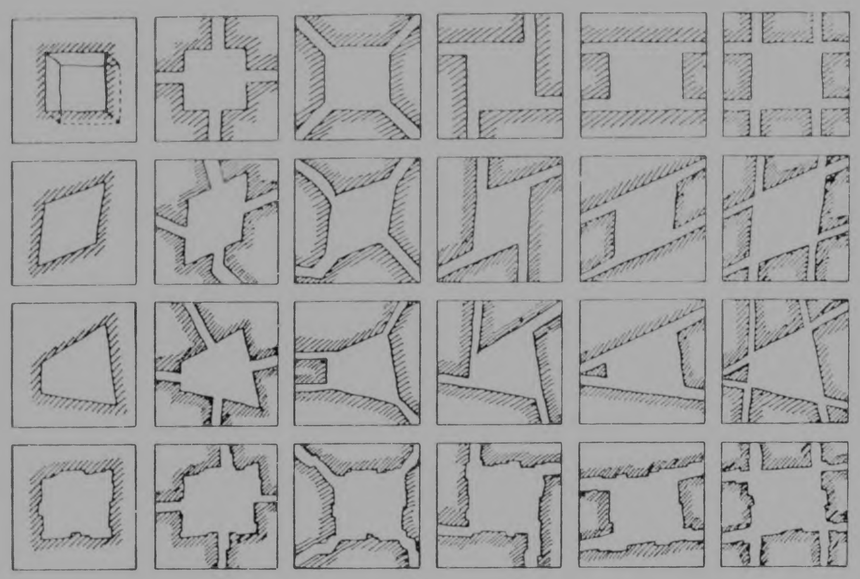
3.1.4A, B, and C. These spaces are demarcated by 16 and 20 m reserves within the cadastral framework. None of the internal connections to buildings can be identified at this scale.

From a more detailed analysis of the primary internal connections located between these external links, it becomes apparent that the broad cadastral framework served as a guide for the creation of space intervals. The primary internal connections have developed mainly alongside these cadastral boundaries and perpendicular to the external linking spaces as indicated on Plans 3.1.5A, B, and C. The linear internal connecting urban spaces are, however, distinctly smaller than the external linking spaces.

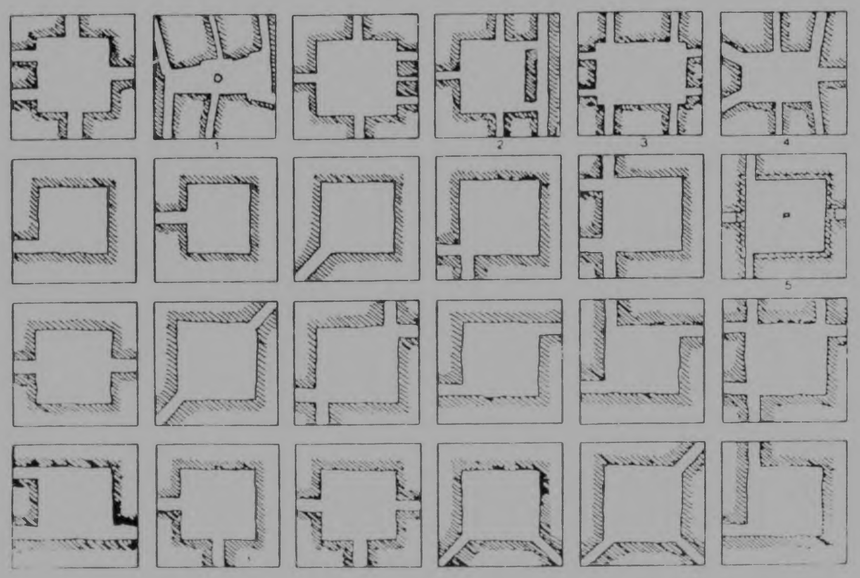
From these primary internal connections along the cadastral boundaries, the secondary connections into the holdings have developed with no guiding framework. It can be seen on Plans 3.1.6A, B, and C that these spaces developed perpendicular to either the primary internal connection between the external links or perpendicular to the external links themselves. These secondary internal connecting urban spaces are again distinctly narrower and shorter than the primary internal connecting urban spaces.

It thus becomes evident that a broad grid framework of communication links and connections were built in the Winterveld residential environment as a result of the people's movement patterns. A clearly distinguishable hierarchical order of communication spaces have been developed and built as indicated on Plan 3.1.2, and in more detail on Plan 3.1.10. These spaces are enclosed by a fine but loose urban grain consisting of mainly single, freestanding family houses and single trees, sparsely spread over the total environment. The urban form emerges and recedes along these linear spaces to create alternating spaces of openness and enclosure.

A system of informed intersections has been developed by the spontaneous setback of houses at the intersections which allows for more activities in an amorphous enlarged space. The relationships between the houses and their juxta positions, however remain such, that the cohesiveness of the environment is seldom lost. The aggregate of the houses, therefore, produces a pattern of uniform unevenness in the urban grain



Sketch 1.



Sketch 2.

Morphological Series of Urban Spaces

At the intersection of these communication and movement spaces the built form recedes in such a way as to create an equally clearly discernable hierarchy of ever changing intersections.

As the population density changes the urban environment and spatial qualities change in the process of building new houses and often demolishing houses of people who have moved elsewhere. Thus urban spaces are in a continuous process of being recreated and renewed. The overall system however, remains as a fixed framework (or concept) of intersecting linear spaces.

Although the broad cadastral framework consists of perpendicular intersecting boundaries, the urban spaces, that were built within this framework, do not intersect in a perpendicular fashion. These spaces usually alternate alongside the boundary lines, beginning and ending in different intersecting spaces.

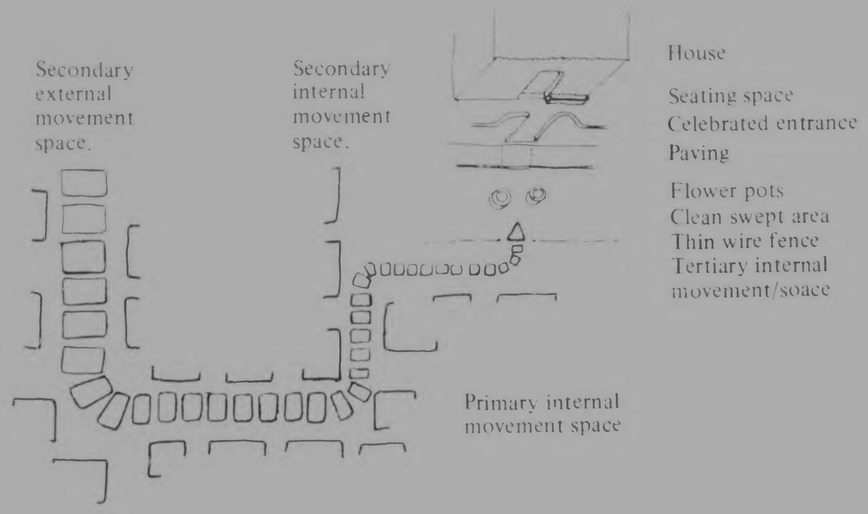
A similarity to Rob Krier's morphological series of spaces,[5] as indicated in sketch 1, especially the last series of spaces in the sketch, is found in Winterveld. As the standard of living and spatial requirements, of the people increase, the spatial qualities and dimensions of the urban spaces can be expected to change and flow into different realms.

In sketch 2, the more formalised geometrical variations into which these presently amorphous spaces of Winterveld could grow into, has been studied by Rob Krier in different, technologically more advanced urban environments.

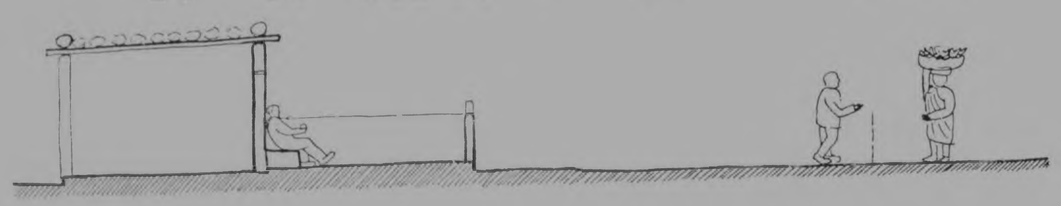
The result, therefore, is that the external links are open-ended whilst the internal connections are all enclosed, although the overall communication and movement system that has been built in Winterveld, comprises a grid which represents a total open and direct physical movement and communication pattern.

ii. Urban Scale

The urban scale is similarly derived from a system of delicately enclosed open spaces. The movement spaces are delineated in an irregular fashion by single-storeyed buildings with flat roofs which demarcate the low vertical scale very clearly. Movement channels within these urban spaces are separated from the



Sketch 3: Progressional approach.



Sketch 3: Section.



Built form with progressional approach demarcating public space and movement channel.

built form by various elements and structures which demarcate a progressive series of spaces from the movement channel to the built form. As indicated on Plan 3.1.12 and sketch 3, these latter structures, which consist of: a thin wire fence, clean swept gravel areas, paved areas, low enclosing walls, paved floors to seating spaces and high enclosing roofed walls, tend to scale down the openness of the urban grain to a single storey level where the receding built form, at intersections, forms the change in hierarchical order of spaces. A hierarchical activity pattern reinforces this informing system.

As indicated on Plan 3.1.13 activities dependent on external linkage are mostly situated along the external movement spaces, whereas activities related to community use, are located at the intersections of the internal movement and communication spaces.

Without doubt, the scale of an urban space is also related to its geometrical qualities like the square, the circle or the triangle. In Winterveld the irregular shape of the square is evident in the horizontal plain.

Thus urban scale is not informed by high vertical built form, but by horizontal arrangement and activity patterns.

iii. Spatial Progression

From the movement channels in the communication and movement spaces, a clearly demarcated series of spaces have been developed by each family. The richness of the variety of spaces depends on each family. In especially the internal connecting spaces, these undulating progression of outdoor living spaces are clearly identifiable.

In moving from the movement channel to the enclosed private dwelling space of each family, these series of spaces consist and/or are separated by a variety of the following elements:

a. A thin wire fence consisting of two or three smooth wire strands separating the movement channel from the individually demarcated home grounds of the individual family.



Variation in spatial progression towards the entrance of the individual house.



b. A clean gravel surface connected to the next space by plants or self-built planting boxes.

c. A flat paved surface separated from the next space by a low enclosing wall.

d. A low enclosing wall with a celebrated gateway into the external open and paved living space, often combined with an existing tree to provide shade and semi-shelter.

e. The enclosed outdoor living space which is separated from the private indoor living space by a 2,7 – 1,9 metre wall with seating space within the outside living space adjacent to the separating wall.

f. The indoor enclosed living space which serves mainly as sleeping space and is connected to the outdoor living space with a doorway and small windows. It is not connected to any other space and therefore serves as the culmination of the spatial progression, from the active movement channel towards the totally passive indoor living space.

The experience to move through these spaces in the approach to each house, is different, (in it's gradual more enclosed progression of spaces) in as much as the residents of each house is different. The richer the variety of spaces and spatial elements, the more innovative the individual family become in expressing themselves in their immediate environment. Thus the total experience of the urban environment becomes a quiet stimulating sensation of the people who live there and their perceptions towards gradual change, from: active movement to passive sleep, from openness to enclosure, from noise to quietness, from public life to private life, from birth to death.

All these life processes are represented in the way these residents have expressed themselves in their urban environment. Thus the undulating progression of spaces in the larger hierarchy of linear public spaces, has been refined and personalized in the awareness of the visitor to the area.

The hierarchy and progression of spaces is therefore followed through as a total urban concept, with a uniform set of principles, in moving through these spaces.



Individual expression in approach to the house.

iv. **Individual living spaces**

The living space for each individual family consists usually of an open outdoor communal living space connected to private individual indoor sleeping spaces. The living system is therefore a system which looks inwards onto the communal central outdoor living space, in a form similar to a courtyard, with outward connections to the gradually more public and active spaces. The outdoor living space is often combined with the shaded space of a tree, if the house could be built to incorporate an existing tree in it's configuration. A celebrated gateway and pathway from a low enclosing wall, connects the outdoor living space through a progression of spaces, to the public movement channel, where pedestrian- and vehicular movement mixes freely.

The private indoor sleeping spaces consist usually of a single row of connected, yet individually operating enclosed spaces. The only outside connection from a private indoor space, is usually to the communal open living space and then, further, through a progression of spaces, as indicated on Plans 3.1.17, 18, 19, and 20.

v. **Criteria affecting urban space**

In the Winterveld urban development the following criteria affected the quality of the urban spaces.

i. Linkage, i.e. external or internal linkage. The informative hierarchical order of urban spaces linking externally or internally.

ii. Connectivity, i.e. the gradual connection of an enclosed living space, through a series of elements and spaces, to a movement space.

iii. Progression of spaces, from the large public spaces to the individual approach to a sleeping space.

iv. Connectivity between built form, i.e. individual freestanding family units and connected family units.

v. Height of built form, i.e. the relationship of horizontal distances between buildings and vertical enclosure of these spaces.

vi. Enclosure of urban spaces by built form, i.e. the juxtaposition of buildings.

vii. Vegetation, i.e. the use of trees as covered outdoor living spaces.

A fundamental feature of the lifestyle in Winterveld is the extension of indoor living activities into open communal spaces. It is a clear semi-public component which is accepted and expressed, in the urban environment.

1.2.2 Liveability Qualities of the Urban Environment

i. Density

The density of the built environment varies considerably from one locality to another in the study area, as well as in the rest of the Winterveld development. This is mainly because the house sizes vary according to the family size and income. A large number of families increase their income by taking in table boarders, and thus the people density within the built environment changes as the boarders move around. The overall gross density in the study area during 1981, was 18 dwelling units to the hectare, with an average size of 72 square metres per dwelling unit. The variation in dwelling sizes is, however, large. It varies from approximately 10–12 square metres to more than 100 square metres per dwelling unit, which provides in a total spectrum of demand and characterises the diversity in the urban environment.

This built pattern which includes enclosed sleeping-, as well as open communal living rooms is more or less evenly spread over the whole study area, which results in a rather homogeneous distribution of irregular urban spaces.

The people density in the study area is variable and difficult to establish, since a large number of families depend from time to time, on live-in-, and table boarders to add to their incomes.[10] It is difficult to establish when and where those families are located. House sizes are therefore not representative of family size. A remarkable feature,[10] is the even balance between the male and female population, as well as the large number of people in the pre-school and primary school age group. People density per hectare, therefore seems high when compared to other urban areas with the same dwelling unit density in the P.W.V. metropolitan area, whereas the built density is of the lower order.



Trees form part of the living environment, and spaces under trees are used as living spaces.



Seating space in the open communal living spaces.

If the open communal living room, and enclosed private sleeping space, as well as the living space under trees are used as total developed living space, there are 10–12 square metres of total developed living space per person in Winterveld.

Since Winterveld is developed to one storey height only, the open space per person in the study area is therefore ± 60 square metres.

ii. Floor Area Ratio (F.A.R.)

The total gross F.A.R. in the study area is 0,13. This, however, represents the F.A.R. of the built environment. If the F.A.R. is calculated to include those living spaces under trees, the F.A.R. is 0,15. It is important to take note of the way in which natural features like trees have been used and incorporated as space-making elements in the living environment as well as in individual family living spaces.

The average use of one hectare can therefore be expressed as follows:

Family size	=	7–8 persons
Built area	=	1 300 m^2
Open area	=	8 500 m^2
Tree covered area	=	200 m^2

used as living spaces.

As a result of the favourable dry climatic conditions in the area, an accepted semi-public lifestyle has evolved where these elements very often are determining factors in the location and design of the living environment. Seating spaces are often constructed around tree trunks to facilitate a shaded seating area with the tree-trunk as support.

iii. Coverage

Coverage of the built environment varies from one local area to another depending on the family sizes and their individual lifestyle requirements. The covered built environment comprises 11% of the total gross area. If, however, the outdoor communal living spaces as well as those living spaces under cover of trees are included, the coverage is 15%. The spatial qualities of the covered built environment, however, is poor in construction. Few, if any, houses have dampproof courses, and those that do not have a cement mixture plaster on the outside walls, need continuous maintenance during and after the rainy season. Roof construction seems in general to be of poor quality.[12]

If the living space and open space qualities of Winterveld are therefore compared to similar developments in the P.W.V. metropolitan area, as well as with those in Mabopane, it appears that the inhabitants are better off spatially, but worse off in the technological quality of their built living spaces. The liveability qualities of the Winterveld urban spaces, whether open or covered are, however, of a fundamentally superior nature since they are representative of each individual family's free expression of lifestyle.

iv. Orientation

The houses in Winterveld are generally orientated to face the street. The north-facing orientation is not the primary consideration in the positioning of the houses. What is, however, important is that the outside communal living space is usually orientated towards, and connected to, the public movement spaces. In general, the houses do not have a backyard facade, as compared to a front-yard facade. The only way to recognise the front entrance to the house is the location of a progression of spaces with a celebrated entrance and pathway to the communal outdoor living-, and communication space, which signifies the front of the house. Since the covered built environment is the culmination of the progression of spaces, there is usually no clearly discernable backdoor situation.

v. Public Urban Infrastructure

Public infrastructure in Winterveld are comprised of :

a A mass transportation system which consists of a bus service along the central spine road through Winterveld connecting to the outside. There are very few privately-owned vehicles.

b Water is supplied from boreholes owned by plot owners. Water is sold per litre from donkey-pulled carts. During the time of study the price of water escalated from 5 cents per 20 litres to 15 cents. This was during a particularly dry season. Water from boreholes at government schools are usually free of charge. No piped water systems exist.

c The general sewerage system consists of pit latrines and grey- or washing water is cast in the open to evaporate in the sun.



Signs of westernization in the roof construction of this house in Winterveld.

d No electricity is supplied in the area. Cooking facilities and lights are based on paraffin.

e Public spaces are uneven gravel surfaces where a lot of dumping takes place since no refuse removal system operates in the area.

vi. **Building cost**

Locally produced and second-hand building materials comprise the major stock for the built environment. Since water is one of the most scarce resources in the Winterveld area, it is one of the biggest expenses in construction there. It is estimated that the building cost, where the family has built the house themselves would be about R150 – R200 per small house. This figure includes the cost of water, a solid front door, basic second-hand window frames, a front door frame, second-hand corrugated iron sheets and a few bags of cement.

Foundations are made by mixing the local gravel with cement and pouring the mixture into a foundation trench to set. Walls are built of sunburnt mud bricks manufactured by the owner and are plastered with a weak cement and mud mixture. The roofs are constructed of rough timber and second-hand corrugated iron sheeting with large stones to hold it down. Floors are usually paved with a mixture of cement and local gravel. The low enclosing walls of the communal living spaces, as well as the seating spaces inside, are built with sunburnt bricks. The surfaces of these spaces, as well as the floors, are often waterproofed by using floor polish. This type of finish is also used to waterproof the foundation.

1.2.3 Socio-Spatial Qualities of the Urban Environment

Winterveld is the self-built urban environment of a people in the process of westernisation. The population is heteregeneous and comprises people in different stages of westernisation. It would, therefore, be untrue to say that the urban environment is the total expression of the cultural background of a specific tribal group at a specific stage of change in history. Some of the urban spaces created have roots in the traditional past of people, but equally, some represent aspirations or change towards a western lifestyle. Those qualities and activities that are important reflections of traditional lifestyles, are present in Winterveld, often next to qualities that represent a western lifestyle.



Winterveld is not representative of any one particular lifestyle.



> "The impression made by a city is often more culturally valid than it's reality."
> (Gutheim, 1963, p. 114.)

The Winterveld urban area can, therefore, not be regarded as being representative of any one specific lifestyle. It would also be inappropriate to ascribe purely western socio-spatial qualities to Winterveld. As a result of direct frequent daily contact with western lifestyles and values, it can be expected that the social lifestyle in Winterveld, will change progressively, towards more westernised ways of life.

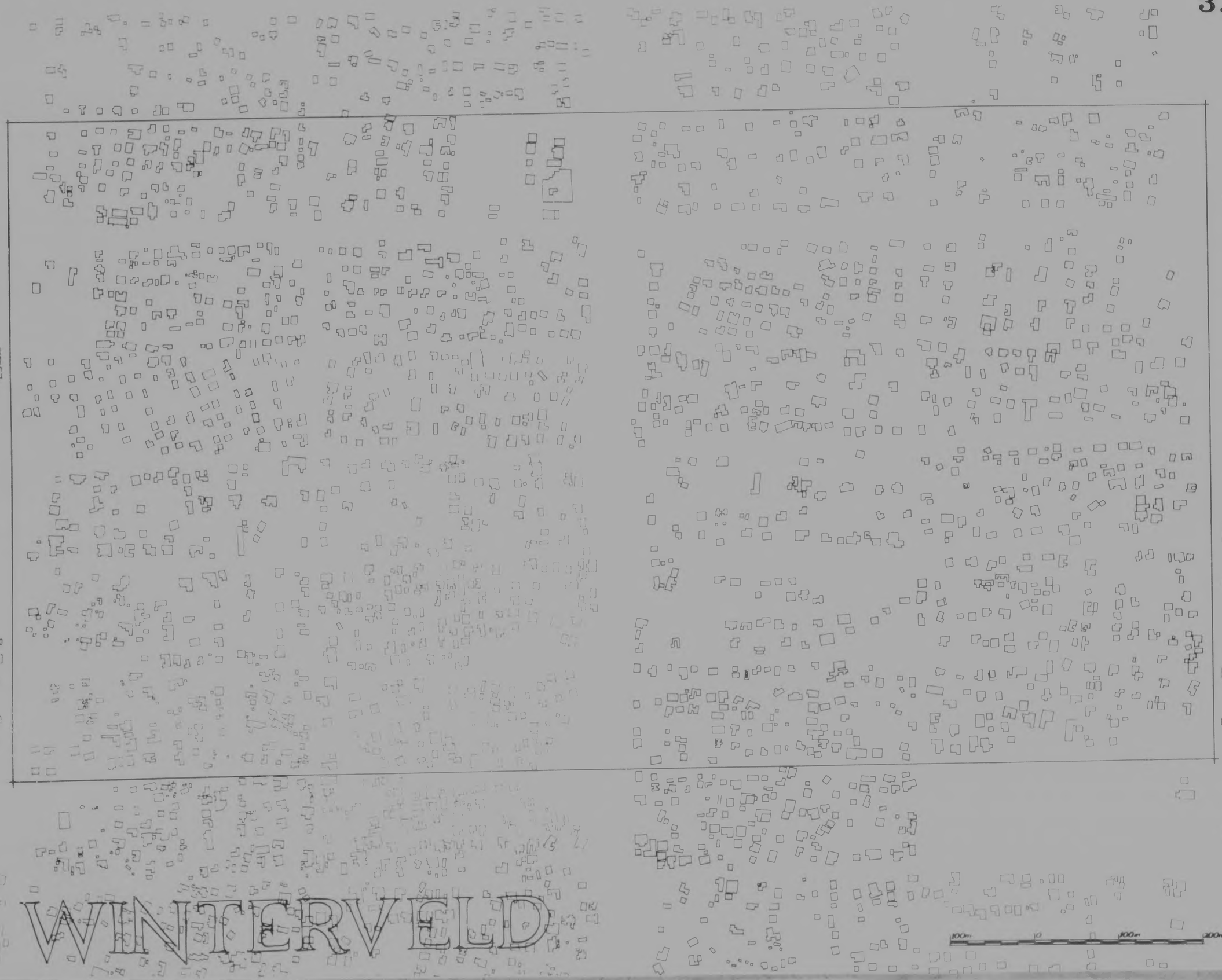
Although the donkey cart shares the same movement space as the bus transportation system while private vehicular ownership is presently low, the aspiration towards motorised mobility and the lifestyle that this represents, is an integral part of the urban awareness and is evident in the presence of motorcar wrecks, second-hand vehicles and the occasional latest expensive model sedan car. So far, however, private ownership of vehicles has not been a dominant space-creating element since it has not affected the spatial location of the families, who do own a vechicle. There is however, a logical expectation that the car will assume growing importance in the Winterveld and similar societies, as the value system of the residents become more westernised over time.

The living activities of the people are typically very public, since the public urban spaces are used as places of meeting and conversation. The communal outdoor living rooms of each individual house is also usually connected to the larger public spaces. Contrary to this, the enclosed living space of each house is very private, hence the construction of small windows and openings to these spaces. It seems therefore that in contrast to the subtle gradation of space from public to private by the arrangement of built form, which follows a certain progressional pattern along a sequential path, are the lifestyles of the people as expressed in this urban environment, as either public or private with little gradation in between. The walls of the houses are fairly thick and soundproof which provides a maximum degree of privacy with added juxtapositions of individual freestanding units in such a way, that the house primarily connects to the public space. This, once again emphasises the sharp contrast between very private and public aspects of their lifestyles.

It is therefore difficult, if not impossible, to relate either purely westernised or traditional reasons for space creation, such as surveillance, defensible space, privacy, and community, to these urban spaces in Winterveld, since their lifestyles, as represented in the urban environment of Winterveld have subtle as well as sharp contrasting elements.

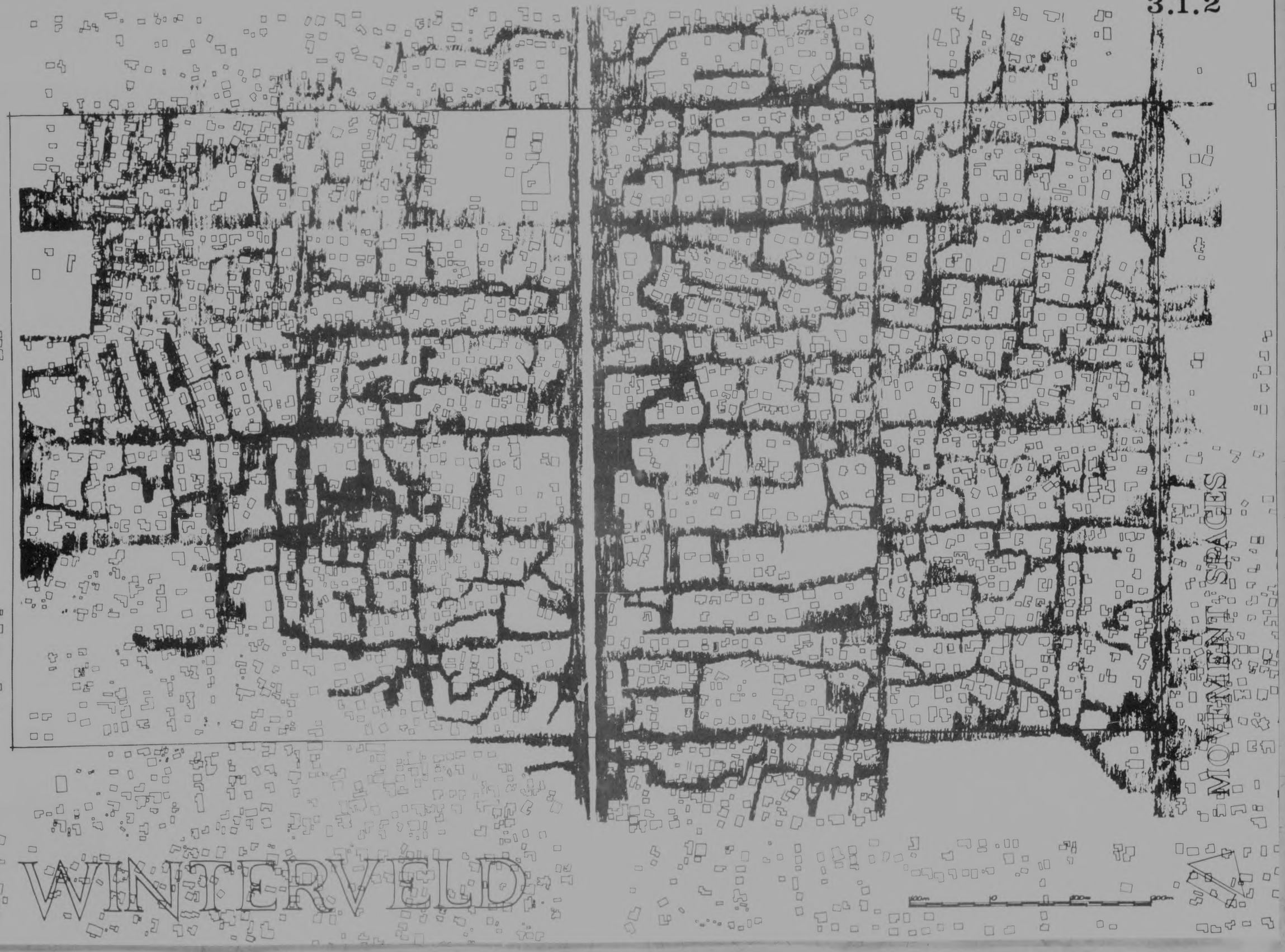
In comparing the overall pattern of the Winterveld development to that of Cross Roads, in the Cape Province, as indicated on Plan 2.6, similarities in structure emerge which indicate that a different population group, in similar circumstances, but in a totally different environment created a similar overall structure in their self-built urban environment. This is indicative of the natural ability of people to create their own meaningful urban spaces and environment without the imposition of artificial space making devices.

3.1.1

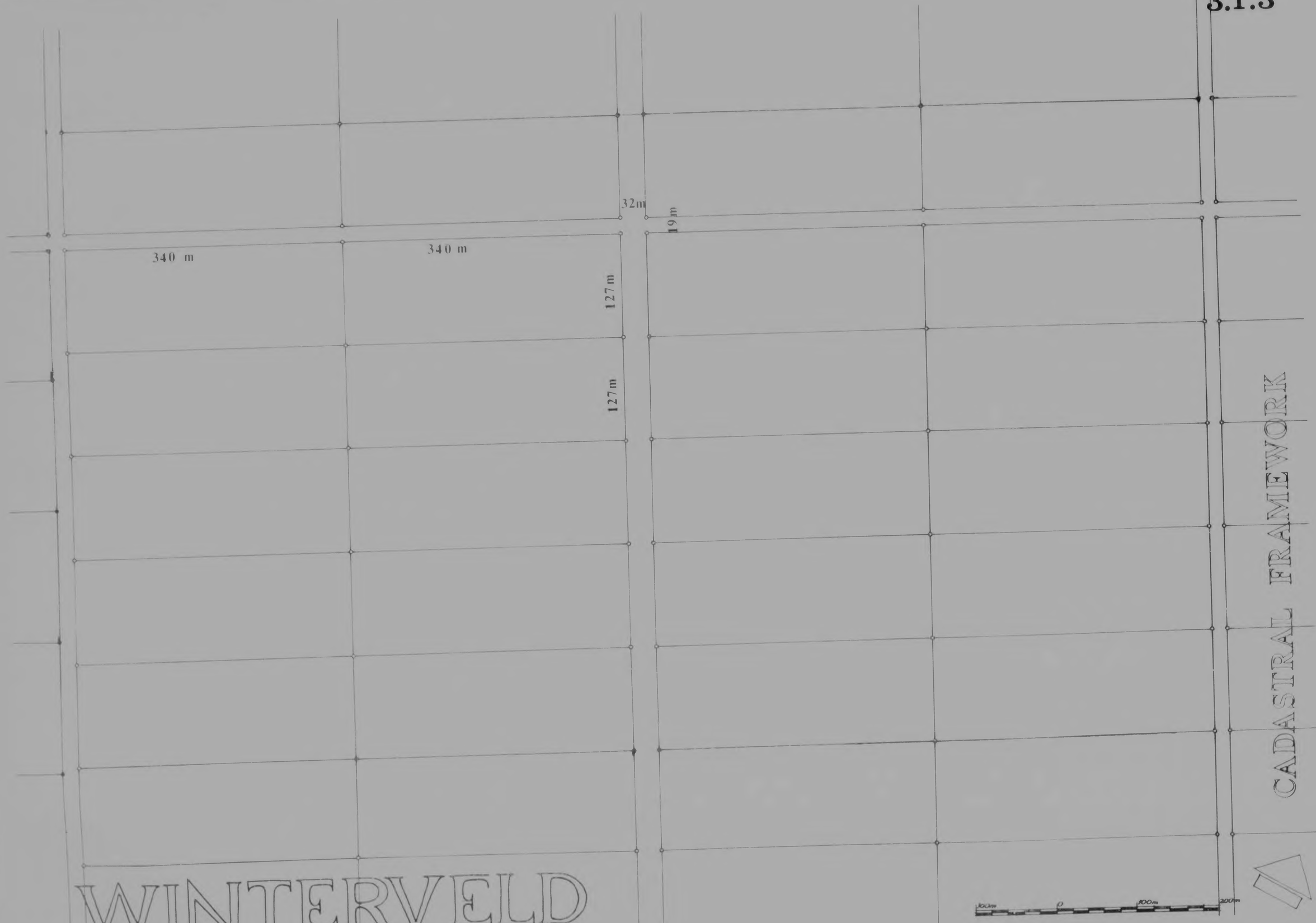


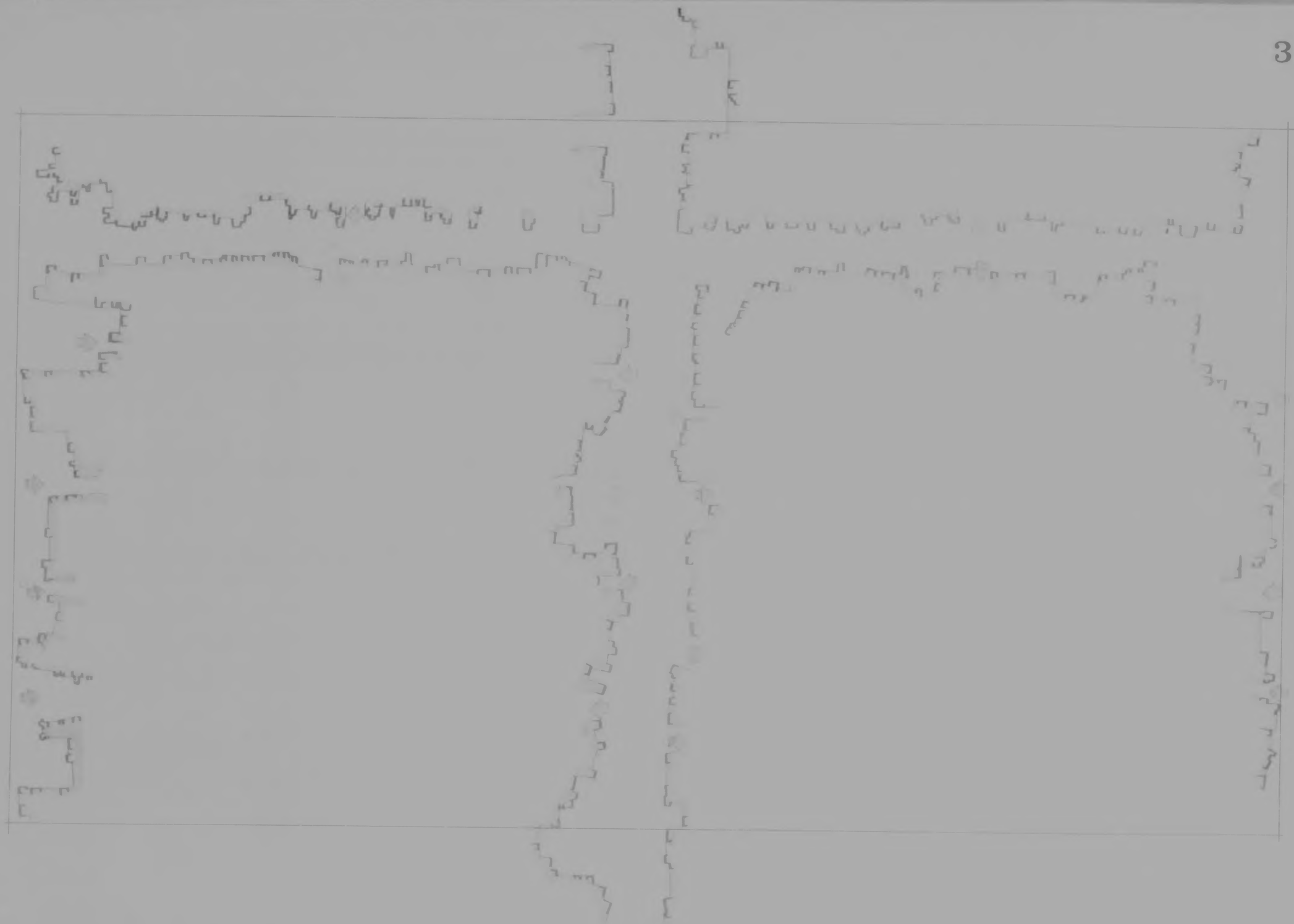
URBANISTEN

3.1.2



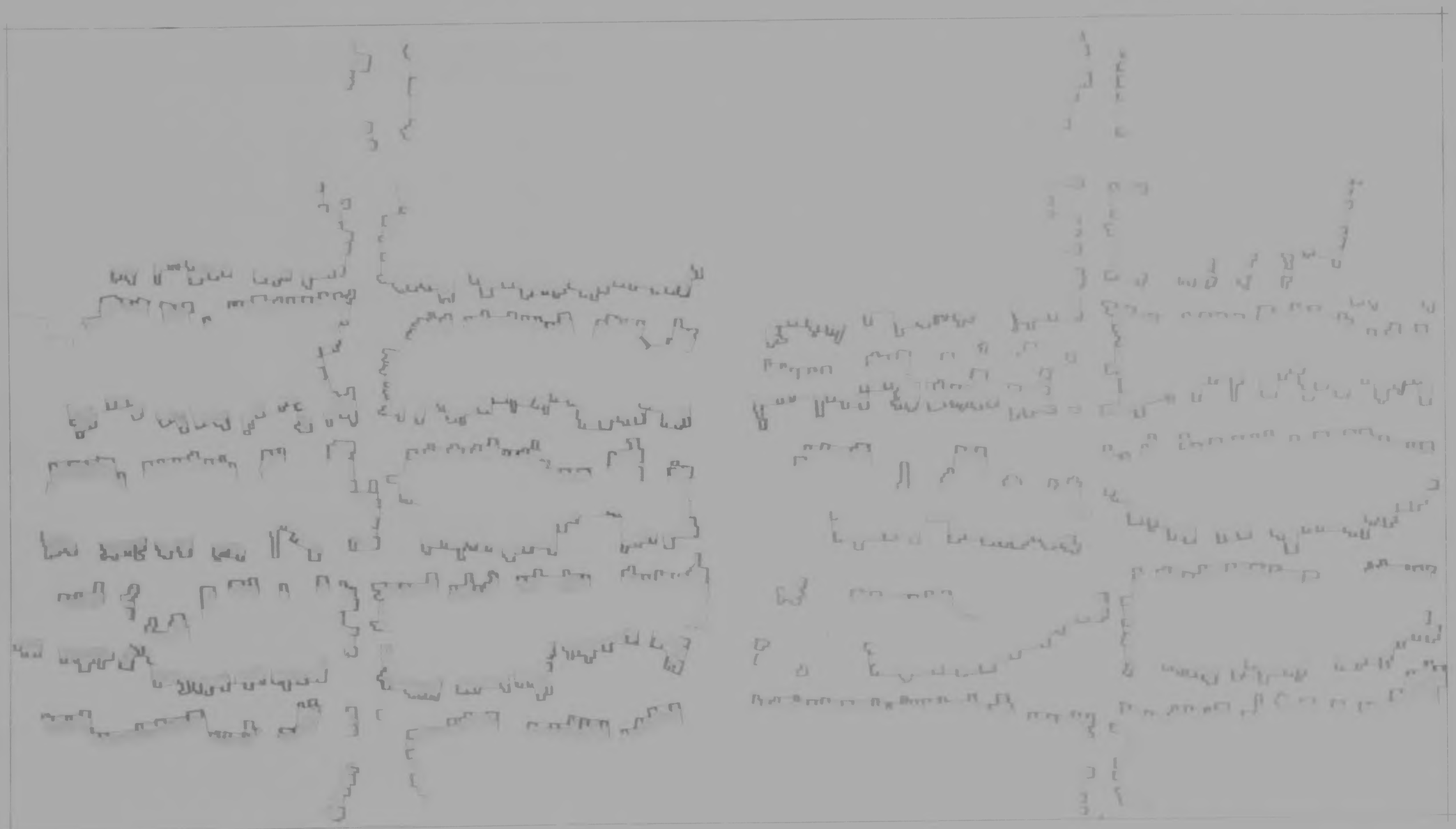
3.1.3


32m
19m
340 m
340 m
127m
127m
WINTERVELD
CADASTRAL FRAMEWORK





WINTERFIELD

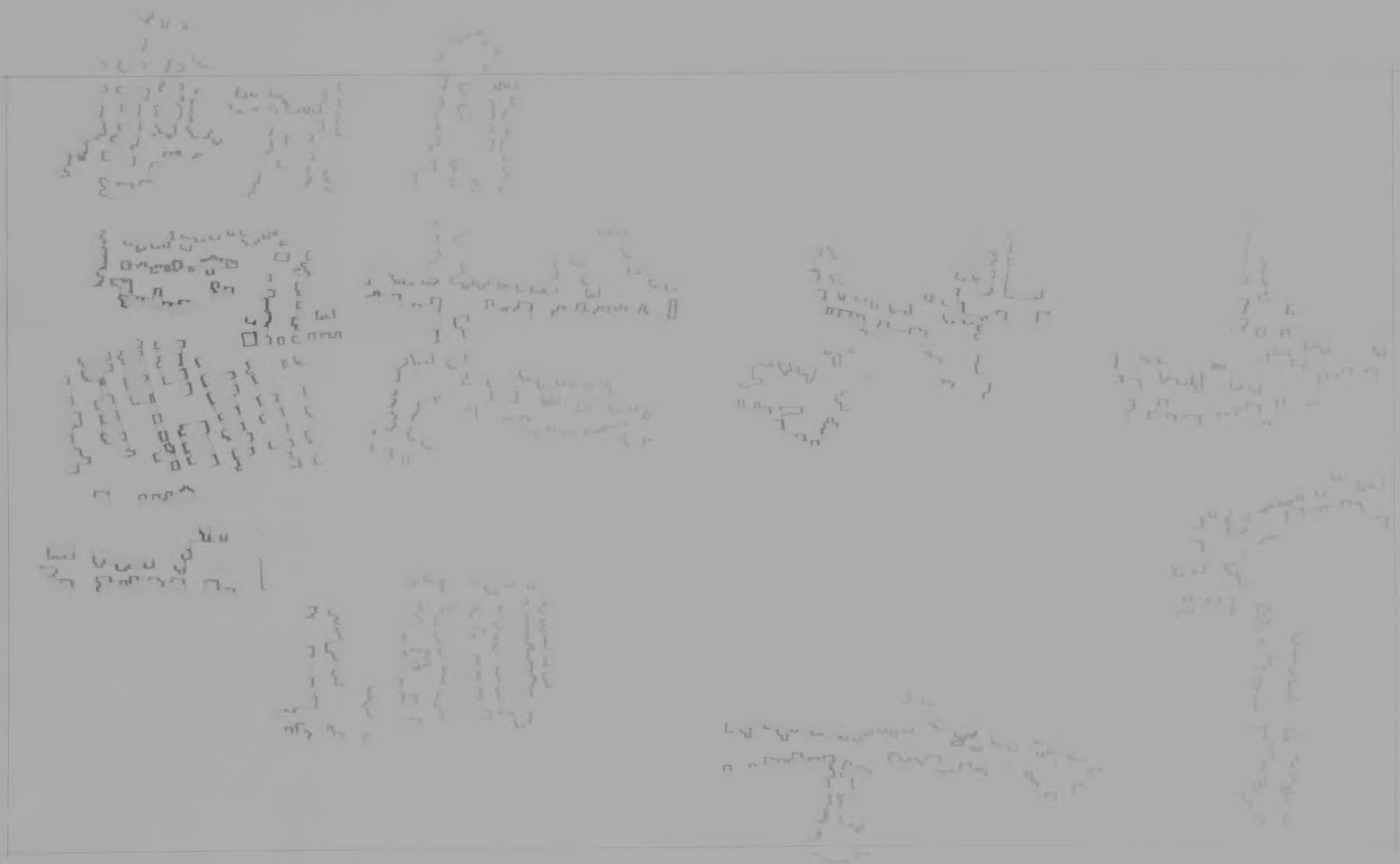


3.1.6.

SECONDARY INTERNAL MOVEMENT SPACES



WINTERVELD



3.1.10

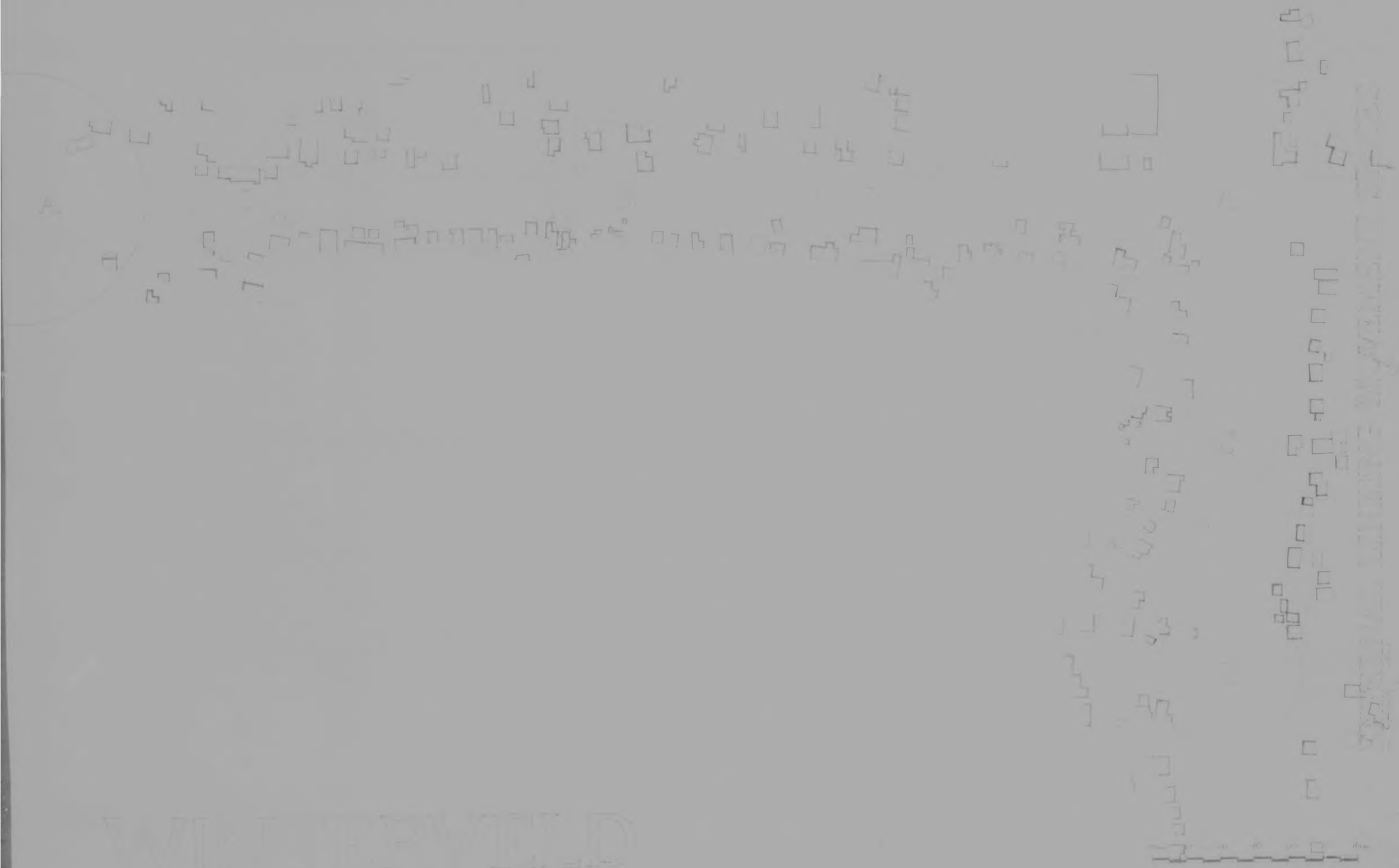
WINTERVELD

3.1.11

WINTERVELD

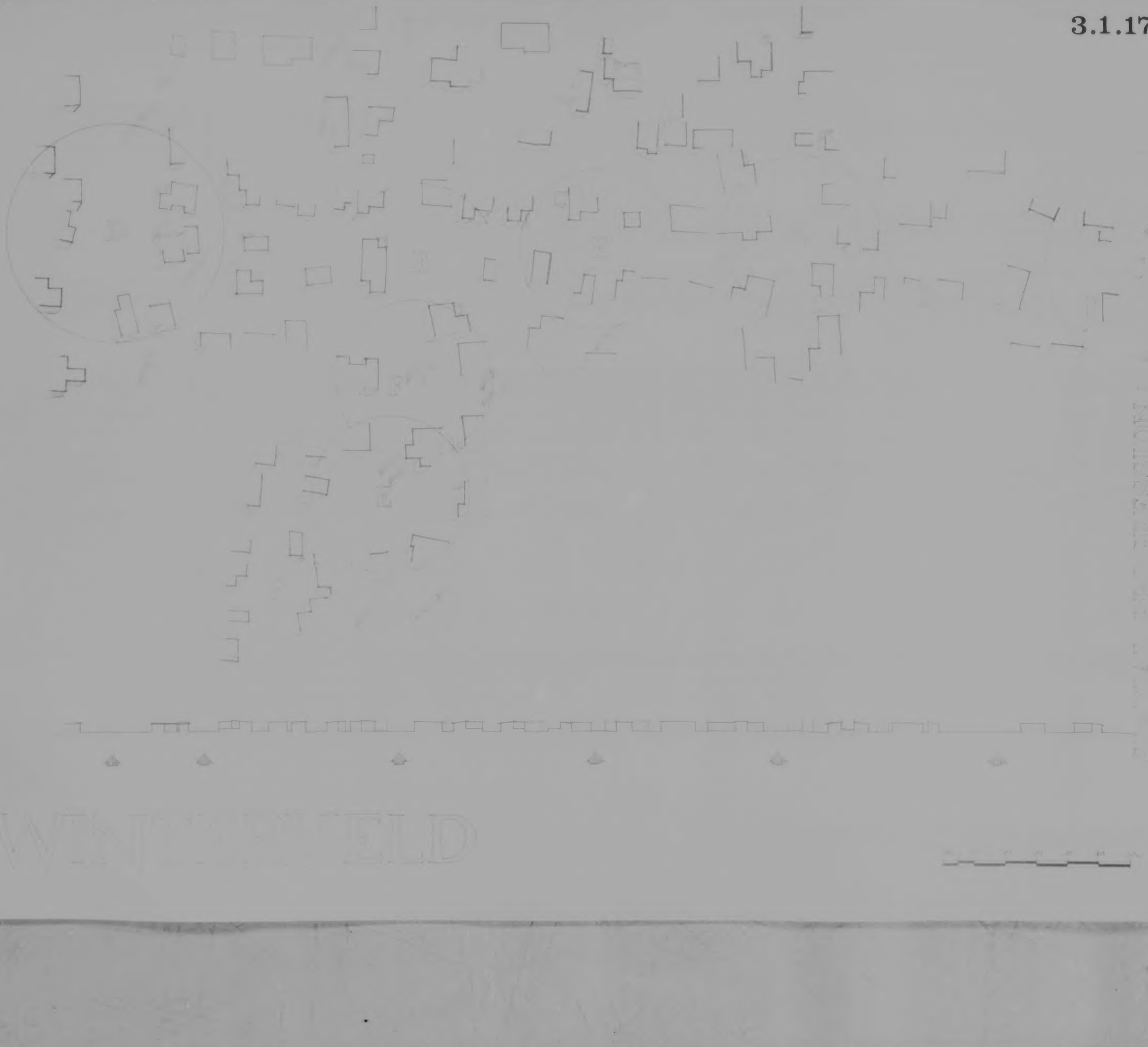
ENCLOSED BUILT SPACES
WALLED IN LIVING SPACES
PAVED OPEN LIVING SPACES
TREE COVERED OPEN LIVING SPACES
FENCED SPACES
PUBLIC SPACES





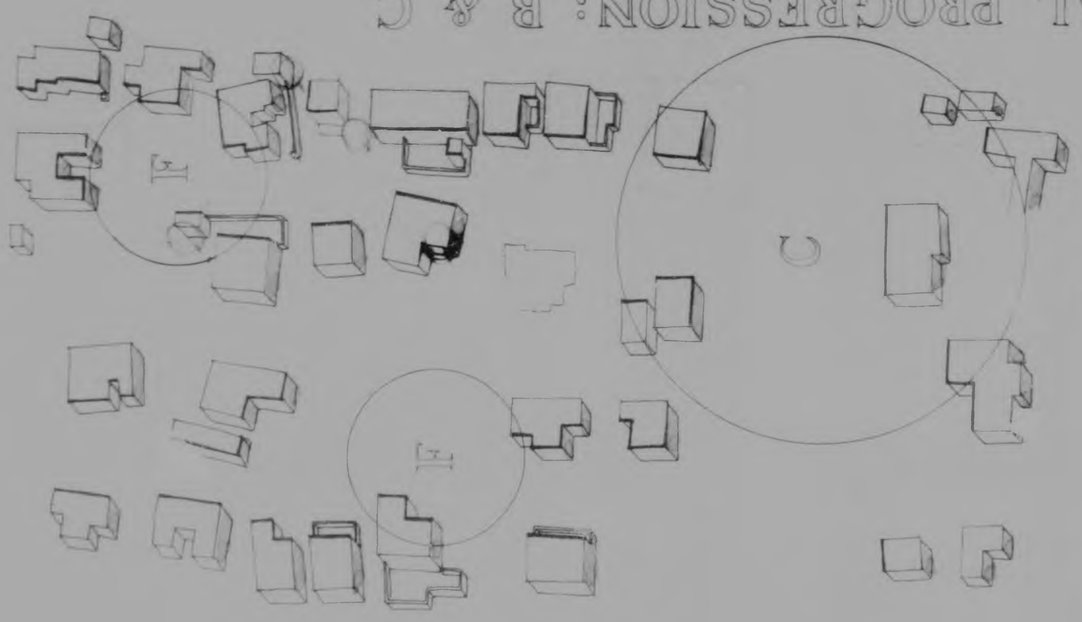
WITHDRAWN

3.1.17

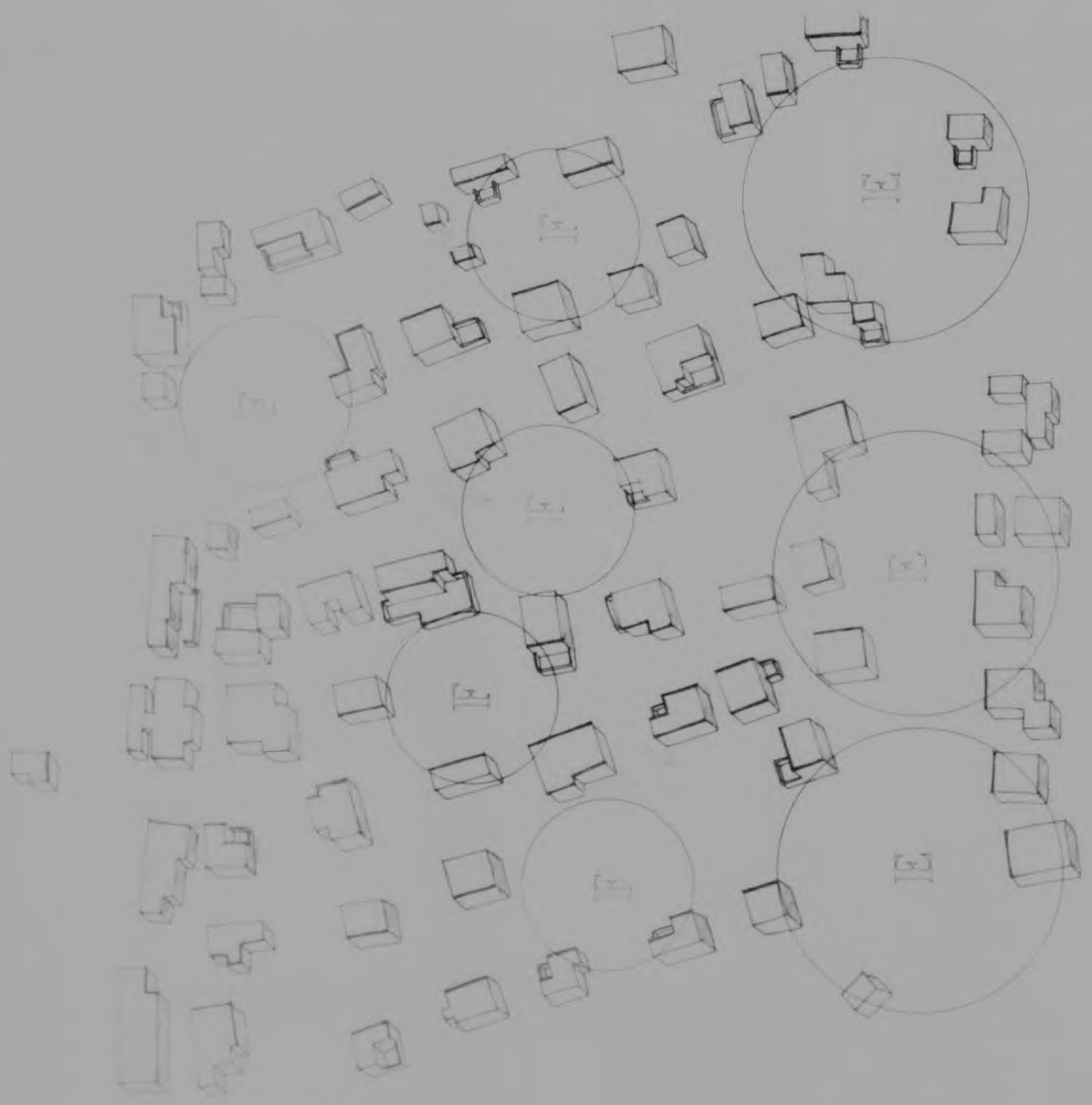


3.1.18

SPATIAL PROGRESSION: B & C







WINTERVELD

3.1.19



3.1.20

2. CONTEMPORARY-DESIGNED HOUSING SCHEME FOR URBANISED BLACK PEOPLE

2.1 Historical Review of the Development of Mabopane Township

The development of Pretoria stagnated during the late fifties, when it functioned primarily as the administrative capital of South Africa. During the late fifties to the early sixties the links between Pretoria and Johannesburg, which is considered to be the financial capital, strengthened to such an extent that the notion of a future Pretoria-Witwatersrand-Vereeniging metropolitan environment became a reality. With economic growth and expansion, the influx of people from the rural areas in search of employment opportunities in the urban areas, accellerated.

Mamelodi and Atteridgeville, the major Black residential areas in the Pretoria municipal area, developed rapidly, and during the early sixties alternative sites had to be found for urban Black residential suburbs and development. The farm Nooitgedacht 256 JR, approximately 15 kilometres north of Pretoria North, was purchased by what was then known as the Bantu Trust, for this purpose.

The Department of Co-operation and Development proceeded with the necessary planning for future residential expansion on the farm Nooitgedacht. The township Mabopane, developed slowly as Atteridgeville and Mamelodi continued to expand within their respective boundaries.

A bus service managed by Putco Bus Operating Company connected Mabopane to employment centres in Pretoria. Thus Mabopane developed also as a predominantly residential urban area for commuters.

2.2 Principles for Urban Space Creation in Mabopane Township

The official policy for the development of urban areas for the lower income groups during the fifties to late seventies, in South Africa, was basically an economic policy, and fully built urban environments were considered to be the most economic way on a national level, to meet the demand and provide in the need for acceptable housing.



The fully built urban environment in Mabopane with added vegetation, which informs public space.

For reasons of health and ease of management, the minimum level of municipal services that was acceptable in the urban and metropolitan environments consisted of water-borne sewerage and a reticulated water system. A system of land ownership of individual plots or sites, with accompanying building regulations as well as the planning approach towards land subdivision, governed all the urban development in South Africa. Thus the following became the dominant space-making elements in the urban fabric of Mabopane.

i. The provision of mass housing to minimise cost.
ii. The approach towards housing as a final product provided by the government.
iii. The provision of waterborne sewerage and reticulated water.
iv. Individual land and house ownership.
v. The sub-economic single free-standing house.
vi. Future evertual private vehicle ownership.

From the above, it can be seen that conventional nationally accepted systems and standards for the development of urban areas, served as a basis for the development of a final urban environment in Mabopane. It was thus a one-sided closed system of decision-making, where the authorities decided on the urban form without consulting the people who were to live there.

2.2.1 Physical Qualities of the Urban Environment

i. Urban Grain

As indicated on Plan 3.2.1 the even distribution of shorter and longer rows of individual buildings of the same size and design, forms a pre-arranged pattern of shorter and longer straight lines. Distances between buildings are regular and similar. It is impossible to identify, at this scale, external and internal links and connections to the area. The lengths of the rows of buildings follow a repetitive pattern and it is apparent that the pre-determined system of land subdivision which was imposed on the topography, guided the building of houses.

The three most important space-making elements at this scale were :



A typical example of public space in Mabopane.



Uninformed perpendicular intersection of public spaces.

(a) The principles guiding planning for vehicular movement systems;
(b) The principles guiding planning for waterborne sewerage.
(c) The principles of land subdivision for individual ownership of small erven.

The first element was accommodated in standardised spaces with cadastral reserve widths of 13, 16 and 20 metres wide. On Plans 3.2.2 and 3.2.4A, B and C the primary connecting urban spaces have been extracted from the urban grain and it is clear that these spaces do not constitute a direct connection from Mabopane to the outside world. From this system the more detailed internal connections are also indirect. There is no apparent system according to which these internal and external communication spaces have been developed, except through an attempt to make these links and connections indirect which tends to slow down vehicular movement. These spaces are lined by evenly distributed individual free-standing built form which creates a monotonous and sterile arrangement of urban space.

Intersections of the different movement spaces are uninformed. The only elements that break the urban grain clearly, and disturb the evenness of built form are the larger groups of buildings which represent the schools. The buildings are also standardised built forms resulting from primarily economic considerations and their effect on the space-making in Mabopane is that of a feeling of loss of space.

In general the urban spaces in Mabopane consist of a loss of space since the built fabric presents a sameness of form which is alternated by the same open spaces between buildings. No attempt has been made towards space-creation by enclosing devices. The evenly sized, smaller subidivions of land served as basis for the positioning of the same house at predetermined distances, according to building regulations governing side spaces, from the internal boundaries. The houses were thus placed within space, instead of being used as space creating elements. Diamond mesh fences, erected on the subdivisaonal boundaries, attempt to define the spaces allocated to each house.

It is therefore clear that the systems which governed the development of Mabopane, are not concerned with space-creation, but are systems to provide mechanical and economic facilities, which result in a lack of spatial definition. These systems have, therefore, not been used to create spaces, but to provide



Demarcation of cadastral boundries as space making elements.



Diamond mesh fences covered by vegetation demarcates public and private spaces.

services and built form at the most economic rate and at the cost of the life-styles of the people.

ii. **Urban Scale**

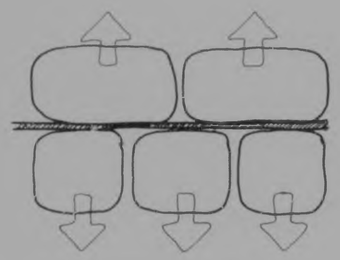
The awareness of urban scale is again an indirect awareness. The system of individual private ownership of small sites, as well as the westernised pitched roof construction, serve as constraining factors in achieving a clearly defined awareness of urban space. In the communication spaces, the cadastral boundaries of the individual plots have been clearly demarcated by diamond mesh wire fences with gates. The built form therefore, becomes a secondary awareness.

Since the open spaces between the buildings are of a similar size to the buildings themselves, an uncertainty as to the urban scale remains. The diamond mesh fences have initiated the planting of vegetation to cover and solidify these fences to become definite structures in the urban spaces, clearly demarcating the sharp line between public and privately owned space. However, it confuses the awareness of urban scale while giving structure to cadastral boundaries.

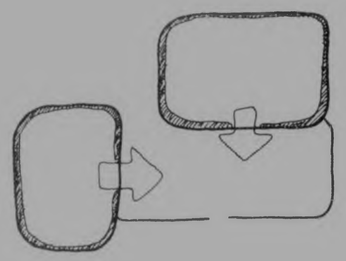
iii. **Use of Spaces**

Spaces have been clearly demarcated by the detailed cadastral framework, which determines those spaces that are for public use and those for private use. On the vertical scale the diamond mesh fence demarcates these different spaces, and thus becomes a visual space-making element. There are no transitional spaces or zones. In the arrangement of the built form, each individual building, placed approximately in the centre of the privately-owned spaces, creates a front and a rear space to the buildings within the privately owned spaces.

A doorway connects the privately enclosed living spaces of each individual family to the front space, and another door connects the enclosed living space to the rear space. As a result of the functional arrangement of the indoor living spaces, which include both living as well as sleeping spaces, in an outward-looking manner, onto unidentified open space attempts were made to define and enclose the privately owned spaces, by planting vegetation along the diamond mesh fences. The attempts are halfhearted since the spaces thus enclosed are neither meaningful in size, nor in function.



Mabopane house



Winterveld house

Sketch 4.

It can thus be seen that the cadastral framework and land development pattern have become yet another layer over the private vehicular ownership and municipal sewerage system that informs urban spaces in Mabopane.

iv. Individual Living Spaces

All the individual living- and spatial arrangements of the various housing units are the same. They consist of a back to back arrangement of different functional spaces looking outwards onto the privately owned outdoor spaces, as explained in sketch 4. In this manner economic principles for the construction of houses underlie the arrangement of living spaces.

The enclosure of living space by the roof, is a westernised lifestyle principle in colder climates, that has been built into this system. This latter system is still part of the European lifestyle pattern that the South Africans inherited from the colder climates in Europe.

Although the enclosed living spaces face outward, the arrangement thereof operates on an inward functional basis to create an inward looking lifestyle. Connection with the public street is, therefore, indirect through the doorway connecting the indoor living spaces to the privately owned open spaces, and a gate connecting the privately owned and publicly owned urban spaces. There is no progression in the spatial arrangement.

v. Elements affecting urban space

In the Mabopane development the following elements affect the quality of the urban spaces :

a. Land ownership, i.e. clearly cadastral demarcated private and public owned land.
b. Individual vehicular ownership and accessibility to houses.
c. The positioning of houses on subdivided land portions.
d. Enclosed indoor lifestyle system.
e. The principles governing the design for waterborne piped sewerage.
f. Vegetation, i.e. the use of hedges and fences to enclose space.
g. The tarmac or gravel strip in the middle of the public spaces for vehicular movement.

2.2.2 Liveability Qualities of the Urban Environment

i. Density

The density of the built environment consists of an evenly distributed uniform built form. The built form is therefore neither indicative of family size, nor income. The overall gross density in the study area in Mabopane during 1981 was 20 dwelling units to the hectare, with an average size of 63 square metres each.

The people density in the study area could be variable but is uninformed by the built form. An average family size of 5,6 persons per house has therefore to be accepted. The male and female population is again balanced, but the number of people in the pre-school and primary school age group is smaller than that of Winterveld. It is, therefore, possible to conclude that urbanisation already has had a diminishing effect on population growth in this society.

The total developed living space per person is 11 square metres in Mabopane. Privately owned space is 62,5–67 square metres per person and public owned space 25 square metres per person.

ii. Floor Area Ratio (F.A.R.)

The total Gross F.A.R. in the study area is 0,13 and represents that of the total covered built environment. Other spaces are not utilised as living spaces, and are therefore not included in the F.A.R.

iii. Coverage

Coverage of the built environment is evenly distributed throughout the study area, except for those spaces which have been demarcated for educational use, and which tend to open up the urban space structure as a result of the provision of sports facilities. In the total environment this has the effect that the residential buildings tend to be more closely located. The covered built environment comprises therefore 13% of the gross area.

The structures that comprise the built environment are of a high standard. All the buildings conform to at least the minimum acceptable standards as laid down



Orientation of houses in Mabopane with spatial arrangements.

by the National Building Code of South Africa. They are damp-proof, weather-proof and of sound roof construction buildings, built of hard burnt brick and cement mortar.

If the technological quality of the living spaces and open spaces of Mabopane are compared to similar developments in the P.W.V. region, as well as to those in Winterveld, it seems as if the Mabopane inhabitants are better off. Spatially, however, they are not, since the liveability quality of the urban spaces has not been consciously developed or designed, nor has it been given any priority.

iv. **Orientation**

The orientation of houses in Mabopane is confusing since no attempt was made to either orientate them towards the north for climatic reasons, or to orientate them to face the street for surveillance or other reasons. It seems however that an attempt was made towards creating more interesting urban spaces by orientating every alternate house parallel to the street and every other house perpendicular or at right angles to the street, which results in a monotonous repetitive meaningless pattern.

In general, the houses have a back and front facade as a result of the arrangement of the internal living spaces. The only way to distinguish between the rear and the front of the houses are the sizes of the two windows on each side of the doorway. The front windows are larger than those at the rear of the houses.

v. **Public Urban Infrastructure**

In Mabopane provision has been made for the full range of public infrastructure which include :

a. A waterborne sewerage system;

b. A reticulated water system;

c. Constructed gravel road surfaces within the public spaces; and

d. A mass transportation system which consists of a bus system along the indirect external communication spaces. In the primary external communication spaces, electric lighting facilities have been provided, but

only a few houses have internal reticulated electricity. A refuse removal system operates within the area.

vi. **Development cost**

The average cost of providing the full range of services to each house in terms of the value of 1984 Rands, would be in the order of R6 000 per house. During the same period the average building cost for the standard of building construction in Mabopane, varied between R5 000 to R7 000 per house. The total cost to provide a house in Mabopane is therefore in the order of R12 000. All the buildings conform to at least the minimum standards as laid down by the National Building Code for South Africa. This means that all the buildings are constructed with hard burnt bricks and cement mortar, with cement washed wall surfaces, damp-proof cources and roof construction with minimum standard roof timbers and cladding. In Mabopane, these consist of rough planed pine timber with Everite Asbestos cladding.

2.2.3 Socio-Spatial Qualities of the Urban Environment

Mabopane represents the system of provision of mass housing on a national scale and the environmental qualities that are created by this approach. This system is economically motivated. However, economic determinism does not necessarily preclude the creation of meaningful urban environments. Since Mabopane is a planned environment, it could be expected that socio-spatial qualities like surveillance, defensible space, privacy and community would have been incorporated in the Mabopane urban design. There are, however, no traces that any of these qualities have consciously been built into the urban environment, since :

i. No conscious effort has been made to connect the indoor living spaces to the street and public environment.

ii. The buildings are placed more or less in the middle of the privately owned spaces and the internal living spaces have been arranged in a back to back, outward looking manner.

iii. The definition of the cadastral boundaries by diamond mesh fences with gates, has created a form of home-ground spatial quality, but since this was not a conscious design effort, but rather results from the system of land ownership, it cannot be regarded as a conscious design input.



Remnants of traditional lifestyles expressed in a westernised environment superimposed on the people.



iv. The living space arrangements of each individual house are such that privacy across the urban spaces is only obtained by virtue of the distance between the built form. The inhabitants have, however, attempted to create their own privacy by planting vegetation along the diamond mesh fences. This is, however, unsuccessful, since the fences are often lower than the windowsill height and window openings still overlook neighbouring properties, especially on the side spaces of the houses where the distance between the houses are less than 35 metres.

v. The arrangement of the houses in long rows facilitates a degree of privacy or isolation on some of the side spaces since no windows overlook these spaces. On the other hand, this configuration creates a sense of isolation.

The street spaces that could have become outside public living spaces, or alternatively, could have become spaces purely for the use of vehicular traffic, create a confused spatial quality. Although the central surfaces are constructed for vehicular use with side spaces for pedestrian use, the streets function more like barriers than communal gathering spaces. The sharp contrast between clearly visually defined public and privately owned spaces, has influenced the Mabopane inhabitants to keep to their privately owned spaces and they have thus developed a different lifestyle to the people in Winterveld, who tend to congregate in the public spaces. It can, therefore, be concluded that the housing system in Mabopane has an isolating effect on the lifestyles of the inhabitants and their use of spaces.

The urban spaces in Mabopane therefore do not draw the community together, but function solely as transportation and services channels. The socio-spatial qualities of the urban environment have consequently become totally sterile.

3. CONCLUSIONS

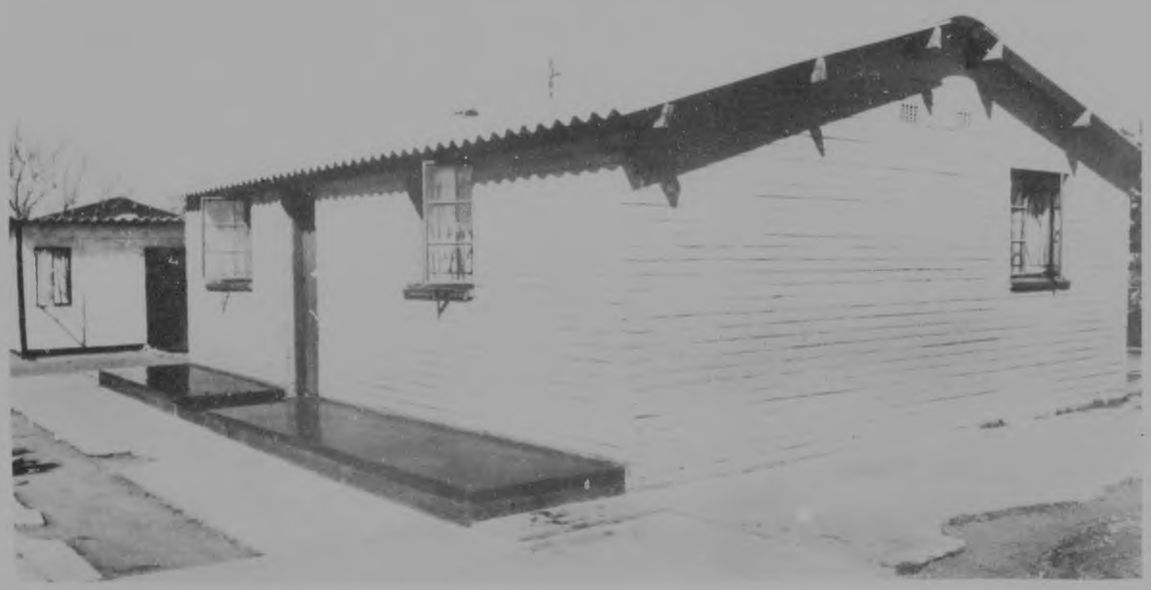
The differences between the urban environments in the two study areas can be summarised as follows:

	Winterveld	Mabopane
Urban grain	even distributed fine grain of a full spectrum of built form	even regulated and regimented distribution of the same built form, with large repetitive educational buildings as the only variation.
Urban scale	clearly defined single storey hierarchical order of progression	indistinct, unclear definition of monotonous repetition of single storeyed build form with lower fences formed by vegetation
Density	18 houses with an average of 72 m^2/ha	20 houses of 63 m^2/ha
F.A.R.	0,13	0,13
Coverage	13–15%	13%
Orientation	towards the public space	perpendicular or parallel to public space
Public services transportation	bus and pedestrian	bus and private vehicle
water	boreholes	piped and reticulated
sewerage	pit latrines	reticulated waterborne
electricity	none	street lights
public spaces	self-created pedestrianised	designed for motor vehicle
Building cost (order figure)	R200 per house	R12 000 per house
Socio-Spatial qualities		
Use of public space	active as outdoor living spaces – mixture of pedestrian and vehicular movement	active as vehicular movement spaces – clear pedestrian and vehicular separation
Use of built form	as a space-creating element	situated in space
Arrangement of living space	inward looking with indoor spaces flowing into outdoor living spaces	Outward looking with no structured outdoor living spaces

The general conclusion from the above analysis of the two study areas in Winterveld and Mabopane, is that, had the planners had the knowledge and understanding of the important elements in space-making which represent the people's lifestyles in Winterveld, Mabopane could have been designed so that it not only complied with the economic requirements for mass housing, but would also have provided opportunities for the people to build important elements of their lifestyle into the urban fabric.



Aspirations towards westernisation in Winterveld.



Evidence of ties to traditional lifestyles in Mabopane.

As Fumihiko Maki states : "... technological possibility can be sanguinely useful only when it is a tool of civilised persons. The inhuman use of technological advance is all too frequently evident in urban environments." (Maki, 1964, p. 9.)

3.1 Space-making elements

The most important space-making elements which affect the lifestyles of people are the dwelling unit and its immediate environs, its connections to the public environment and the connection of this public environment to the greater urban and metropolitan environment.

The stoep or communal outdoor living space is a functional transitional space between the public thoroughfare and the private home. It is conceptually the meeting place between the family and their urban environment and it is visually a means of viewing the street as an entity. "From house to street it is a link by mediation, and from house to house along the street, it is a link repetition." (Maki, 1964, p. 38.)

The provision of a higher level of infrastructure does not necessarily have to detract from the spatial qualities of the urban environment. Out of necessity it will be more expensive. Answering to a strict economic framework need also not culminate in an urban environment which imposes a totally foreign lifestyle on the residents. It is therefore important that in planning urban environments, those space-making elements and principles which represent the lifestyles of people be combined with those elements and requirements which facilitate a higher standard of quality of life in the urban environment.

3.2 Space-making framework applying the environmental design elements of Winterveld and the standards of Mabopane to a de novo site for Winterveld 2

The undermentioned elements have been identified as important in the Winterveld urban environment as they generate those spaces that accommodate and reflect the lifestyles of the residents. These space-making elements are indicated on Plans 3.1.11, 3.1.19 and 20.

i. Ownership of land need not be informed by cadastral boundaries. The important factor here is security of land tenure. Private ownership of land in the Winterveld area is demarcated by cadastral boundaries which are not spatially



Winterveld school forms part of the built fabric and space making elements.



Mabopane school is a building situated in space and does not form part of the urban grain.

informed. An overlay of a system of Certificate of Rights as exercised in Botswana on each individual plot would provide the necessary security of tenure for the present tenants, and thus create a system of ownership which is not spatially demarcated or informed. Thus in a designed urban environment those large portions of land between public movement spaces could be allocated to various private individuals on a Certificate of Rights basis. This will enable the people to create their own environment within a conrolled situation which has been planned for future upgrading.

ii. The sizes of the public movement spaces in Winterveld conform to those standards and requirements as laid down by the C.S.I.R. in their latest document on engineering standards for residential development, since the minimum width of these spaces in Winterveld are 8 metres wide at isolated places. Thus the Winterveld spaces can accommodate those standards required for movement spaces for vehicles in residential environments.

iii. Reticulated public services to the Mabopane standards, can easily be accommodated in the public spaces and connected to the built form surrounding them in Winterveld. However, the principle in Mabopane of having services on mid block, should preferably not be applied to a new area, since it could result in the creation of wasted spaces, or serve as a constraint in creating the built environment.

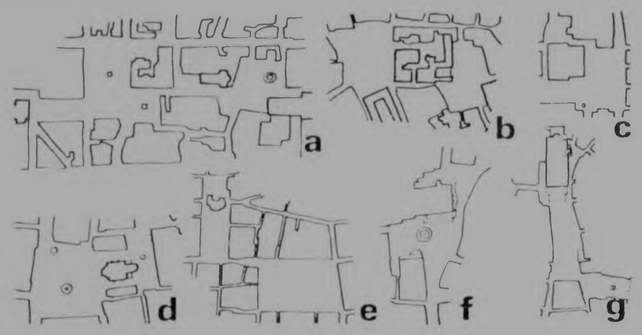
iv. The pattern of direct external connecting public movement spaces which are informed by openness in built form and external linking activities developed alongside and at the intersections of these spaces.

v. The more indirect connections and intersections of the primary internal public movement spaces which are again informed by both communal activities and receding built form.

vi. The informed intersections of the secondary public movement spaces and primary internal movement spaces by communal activities and receding built form.

vii. The indirect connections and intersections of the inter-connecting secondary public movement spaces, and enclosure thereof by built form.

viii. The construction of the built form can be improved by applying those basic principles for weather-proofing and sound construction which were governed by minimum standards in Mabopane.



The Winterveld urban spaces resemble the form of the urban spaces developed in historic cities before the introduction of the motorised vehicle, as can be seen from the above sketch from A.E.J. Morris's work, History of Urban Form.

ix. The visual direct connection of the private communal open living space to the public space for surveillance.

x. The arrangement of the enclosed living spaces in individually operating single connected spaces, connected, in turn, to an open communal living space through a progression of urban spaces by means of a celebrated gateway and pathway to the public urban movement spaces.

xi. Families can shape their immediate home environment themselves, but need guidance in :

1. An overall masterplan (cadastral framework)
2. Improved building standards
3. Planting programmes.

In Mabopane the following elements became important :

i. The public sector should only build public buildings.

ii. The public sector should involve the residents in the development and maintenace of public spaces.

It is, therefore, possible to combine the space-making elements in the self-built urban environment with design or planned standards, in order to create and design an urban environment which is superior to both the former environments.

3.3 Conclusions

It can thus be seen that the development of Winterveld, as opposed to that of Mabopane, followed urban design concepts and principles in the process of being-self-built.

The fourth dimension of time as described by David A. Crane[19] in his concept of the dynamic city, plays an important role in the creation of urban spaces in Winterveld, contrary to Mabopane where this dimension is absent.

Winterveld has no pre-arranged town form or structure imposed by a designer and thus allows a free expression of the concepts of predictability, symbolic place, malleability and electability.[19] Although



Space making in Winterveld.



Loss of space in Mabopane.

the development of activity patterns in Mabopane was pre-arranged, no definite locational rythms of land units, or activities could be found in the development.

The built form in Winterveld is a clear example of group form, as described by Fumihiko Maki[1] who stated that group form generally evolves from the people of a society (as in Winterveld), than from powerful leadership, (which was the situation in Mabopane).

He states further that the human quality which determines form has to do with the way of life, movement and relation of persons in society.[1] If the function of urban design is the patterning of human activities as they express life in cities, then the functional patterns are crystalised activity patterns, as is evident in Winterveld.

Stanley Tankel[4] clearly states that street scale urban spaces are mostly creations of man and thus unique examples of expressions of the human activities of the people who live in the city.

Once again, those street scale man-made expressions of lifestyle are absent in Mabopane whilst they are clearly visible in the arrangement of built form in Winterveld, which creates sequential paths as described by Fumihiko Maki.[2]

Frederich Gutheim[3] said that the requirements of an individual, family and community life are recognised in urban design, or they are ignored. It can be seen that these requirements, which are evocative of the city and its residents, were ignored in Mabopane. Thus, it could be said that urban design had no function in the development of Mabopane, but, through the residents, influenced the development of Winterveld.

3.2.1



3.2.2

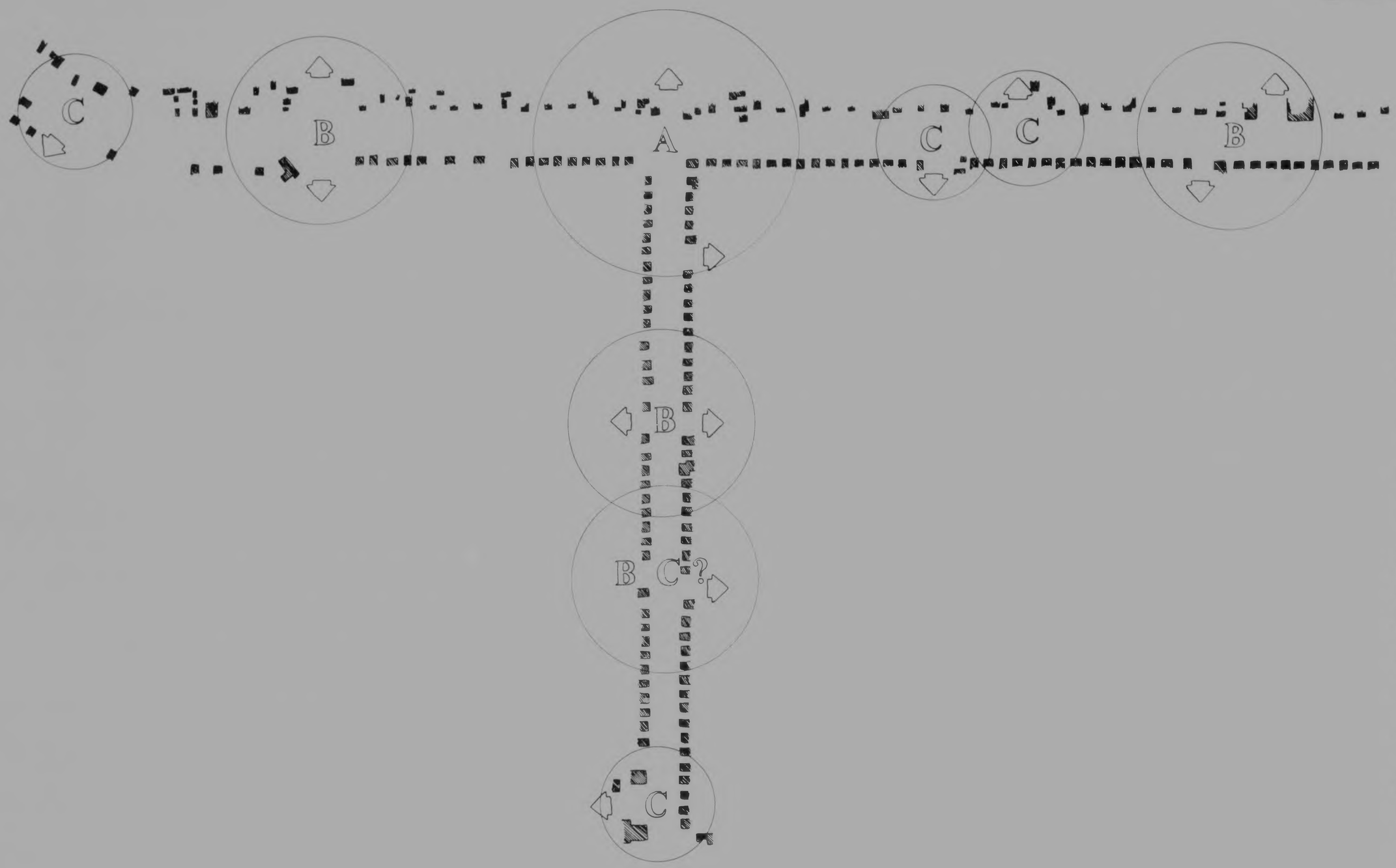


MABOPANE

3.2.3



3.2.4

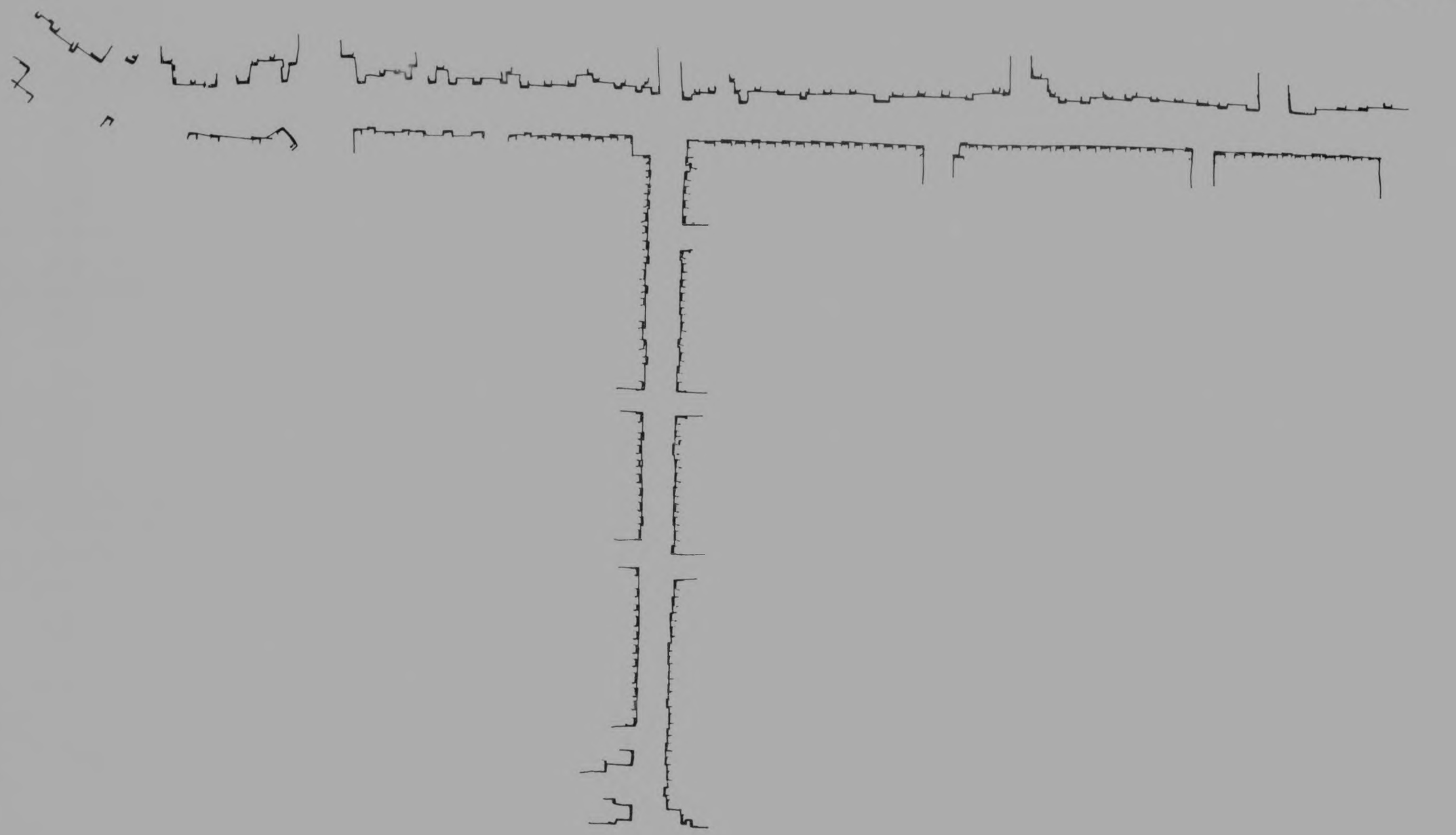


EXTERNAL LINKING MOVEMENT SPACES

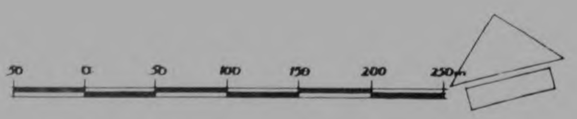
MABOPANE

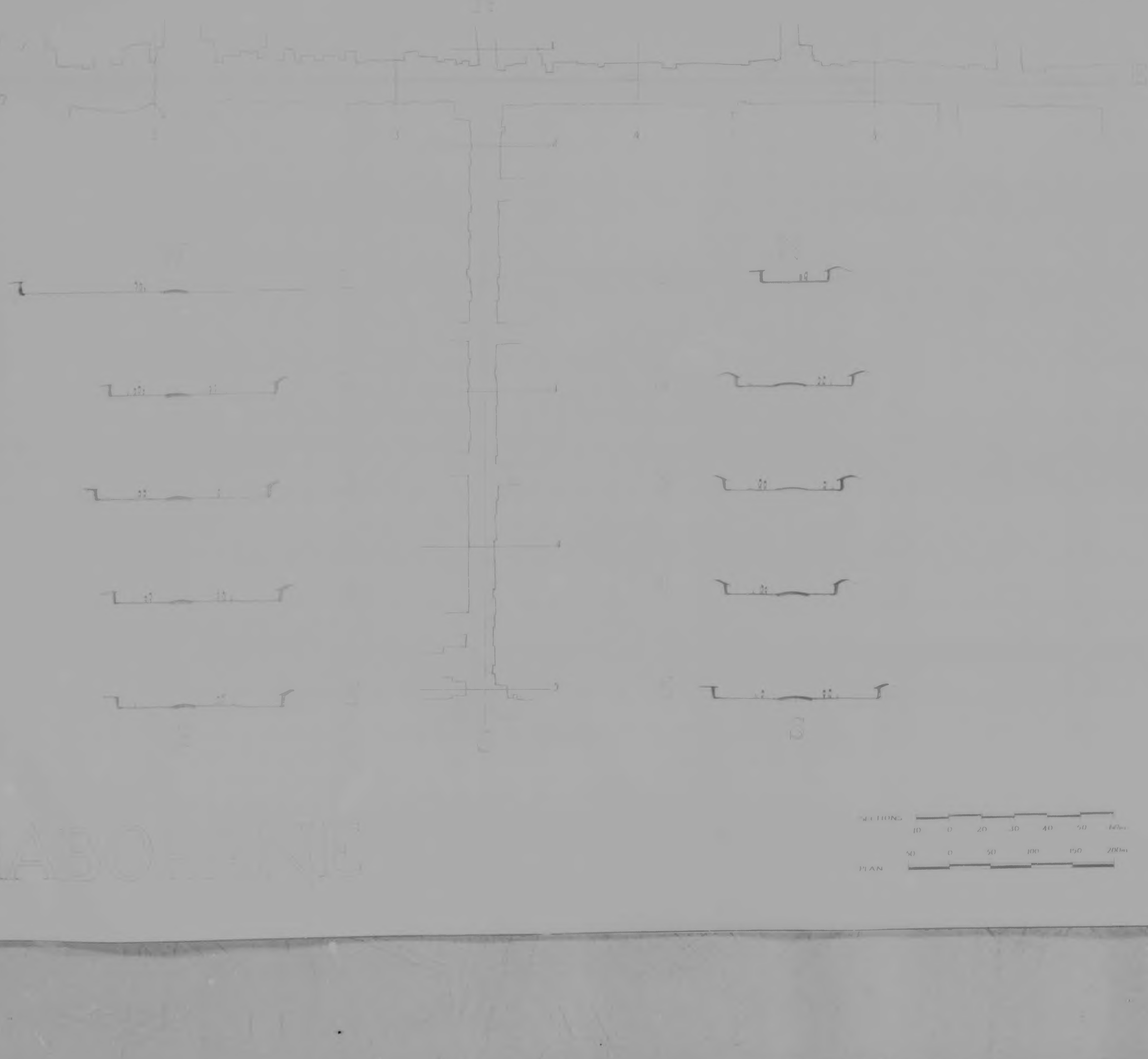
50 0 50 100 150 200 250m

3.2.4 B

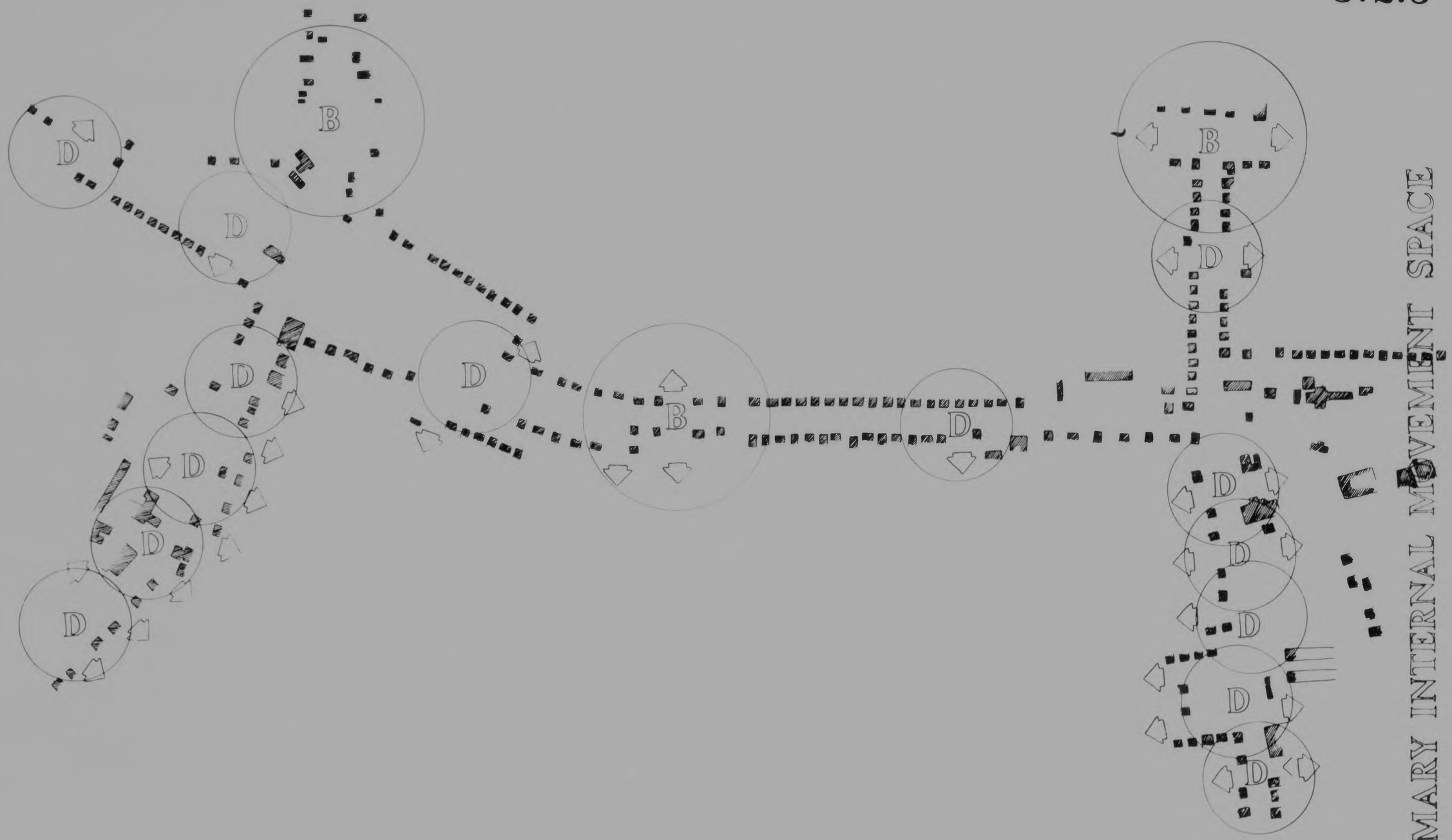


MABOPANE




SECTIONS
10 0 20 30 40 50 60m
PLAN
50 0 50 100 150 200m

3.2.5



MABOPANE

50 0 50 100 150 200 250m

3.2.10









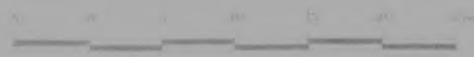






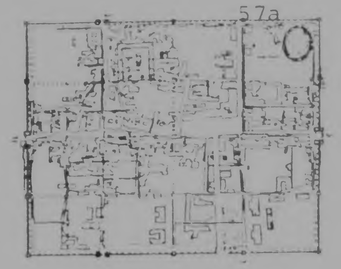








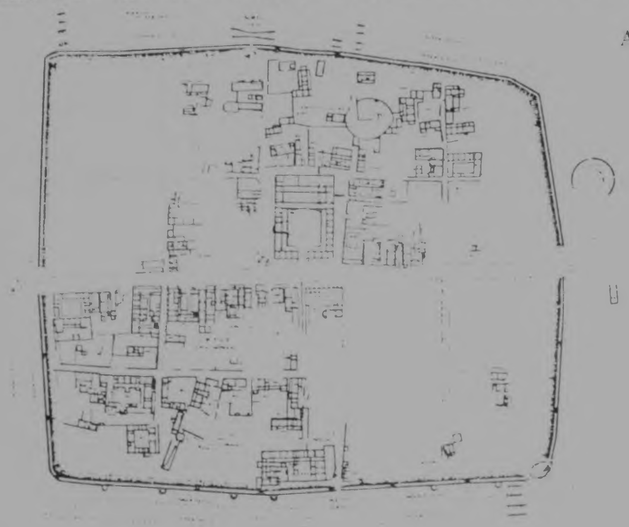
MOHENJO-DARO
detail plan of
excavated
housing area.



Example of medieval
civic spaces.



An artist impression of Priene.



Venta Silurum
(Caerwent)

Sketches 5, 6, 7, 8

CHAPTER IV
THEORETICAL ANALYSIS

Since urban design theories evolved over time from those periods in history when people still created and build their cities themselves, with locally available material and technology, the validity of these theories to a similar situation, in a period when regulatory and technological constraints govern the building of cities, is being ascertained.

The objective is to see to what extent a self-built environment and a technologically developed environment, which were created in the same time period in history, answer to these theories.

It is also regarded as important to see wether these theories, which were developed from westernised lifestyles hold true universally, or wether they pertain to the lifestyles of a particular group of people under particular circumstances.

Therefore this, chapter is a study of the contemporary urban design theories to ascertain their validity in the study areas of both Winterveld and Mabopane. The following theories are investigated:

1. Historical space-making in urban environments.
2. The dynamic city.
3. Collective form.
4. Linkage.
5. Predictability.
6. Symbolic place
7. Malleability.
8. Selectability.
9. Space.
10. Defensible space.
11. Community.
12. Privacy.
13. Conclusions.

4.1 Historical Space-Making in Urban Environments

As can be seen from sketches 5 –8, many cities have developed historically in variations of grid patterns. The underlying basis for these patterns lay in pedestrian communication systems which were based on easy and direct access to activity nodes.



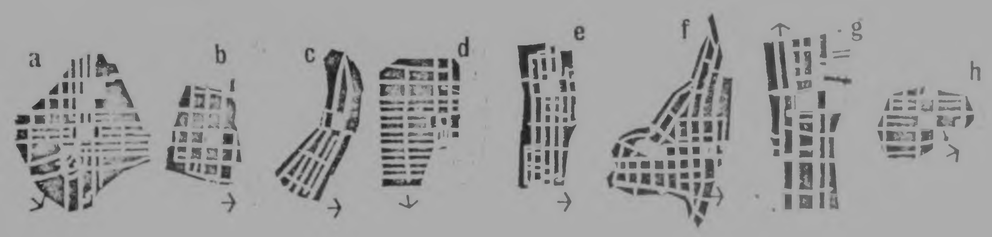
Carcassone, the baside *ville-basse* related to the original hilltop *cité*. On the other side of the Aude.



Monflanquin, detail plan, giving modern plot boundries within the area of the bastide and showing the surrounding suburban development.



Rome, a section of Nolli's plan of 1748, between the Tiber and the Piazza Navona (north at the top).



Eight French bastide plans illustrating their essential 'variations-on-a-theme' character. Key: a, Villeréal; b, Lalinde; c, Castillonnes; d, Eymet; e, Villefranche-du-Périgord; f, Domme; g, Beaumont; h, Monflanquin.

History of Urban Form.

The Winterveld development has the same underlying grid principle built into its communication system, since it is also based on pedestrian movement, and private vehicular ownership is very low. Thus, the overall development pattern of Winterveld conforms to an historical urban design principle of communication systems. Rob Krier[5] states that every town has a large number of extremely interesting street plans, which are uniquely linked to the place's history, topography and its inhabitants.

Mabopane, however, was developed for a constrained vehicular movement system, which is totally unsympathetic to pedestrian movement.

Frederich Gutheim[3] felt that cities are such compound structures of social activity, as well as of bricks and mortar, political loyalties, transportation movement, civic art, water supply and sewerage disposal and that our contemplation of the motives for change and any balanced proposals for new directions of growth must reflect all the relevant factors.

Mabopane reflects a singularly confused approach towards canalising and ordering vehicular movement without achieving the richness in urban fabric that Gutheim strives for. Winterveld, on the other hand, has achieved a delicate richness in quality.

Fumihiko Maki[1] felt that the differences between the efforts of contemprary designers should create quite different urban environments than their historical counterparts did, since they have to consciously evolve forms over a shorter period of time.

The time period in which Winterveld and Mabopane were developed was, however, virtually the same, i.e. during the past 30 years and therefore this argument does not apply here.

4.2 The Dynamic City

The theory of the dynamic city, as described by Crane[14] refers to:

1. rapid acceleration of change in city life forms an unequal physical progress.
2. interdependence of life and structures over great space-time scales and lack of matching scales of change distribution.
3. complexity, multiplicity and power of the city of a Thousand Designers. (Crane, May 1960, AIA Journal).

The Winterveld development reflects the concepts of this theory. Although the development is less than 30 years old, and has not gone through periods of dramatic change, the subtle change in the forms and shapes of urban spaces, by the movement of people from one plot to another, reflects the essence of this theory in the continual change of urban form.

Mabopane, however, has remained static in almost all apects, and as such does not comply with this theory.

4.3 Collective Form

According to Fumihiko Maki[1] the collective form represents groups of buildings and quasi buildings – the segment of our cities. Collective form is, however, not a collection of unrelated separate buildings, but of buildings that are situated together for a purpose. The problem is whether in urban design an adequate spatial language exists with which space can be created and organised within a master plan programme.

Both Winterveld and Mabopane are examples of collective form in the built environment with a difference in cohesiveness. In both situations, the architectural appearance and materials used in the built environment are related. However, in the Winterveld environment, the built form is a rich variety of buildings constructed of the same materials, whereas in the Mabopane environment the built form consists of a repetitive monotonous pattern of the same building.

In Winterveld a conscious effort was made to enclose the urban spaces between buildings, thus creating a cohesive development. In Mabopane no attempt was made to enclose the spaces between buildings, which, in turn, created a dispersed quality in the environment. Thus Winterveld has an understandable and recognisable spatial language in the urban environment which creates legible and functional urban spaces and patterns. The spatial language in Mabopane is of a technological origin, which does not reflect the lifestyles and values of the residents. It thus has an illegible quality.

4.4 Linkage

Linkage is described by Fumihiko Maki[2] as being the "glue of the city". It is the act by which we unite all the layers of activity and resulting physical form in the city. In sofar as linkage is successful, the city is a recognisable and humanly understandable entity.

He further declares that forms in group form have their own built-in links, whether expressed or latent, so that they may grow in a system. These define basic environmental space. Thus group form can inform linkage, which is evident in the receding built form at the intersections of communication spaces in Winterveld.

In this context, linkage[1] can also be defined as follows:

Linking, or disclosing linkage are invariant activities in making collective form out of either discreet or associate elements. In operational terms there are a number of linkages physically connected, implying, built-in links, etc.

In the historical context,[1] examples of linkage have developed in each place, each moment, with its own characteristic form for making coherent physical form. It is interesting to see how, and why, particular links were used.

In the Winterveld development, the recent historical development of the activity pattern has created clearly defined examples of linkage in the public transportation- and pedestrian movement systems. Linkage in Mabopane is non-existent since a conscious attempt was made in the design of the urban environment to discourage movement and thus, in turn, linkage did not develop.

4.5 Predictability

The hierarchical ordering of movement- and outdoor living spaces in Winterveld has informed the activity pattern, which is a clear expression of Crane's[19] theory on predictability in the structure of the city. Movement channels have been arranged and the structure of the urban environment conferred by the people in definite locational rythms of activities, and a future pattern of capital web.

Although the Mabopane development makes certain that future traffic can only move in pre-arranged channels, the location of activities and land units do not follow a predictable rythm, thus the theory on predictability does not apply to Mabopane.

4.6 Symbolic place

Crane[19] stated that the criterion of symbolic place draws on the value of well-ordered locations as a meaningful and underrated aspect of form. In the Winterveld these places

are not only expressed in the informed intersections of movement spaces, but also in the arrangement of activity patterns where community activities are found at the intersections of internal spaces, and commercially orientated activities along the external linking movement spaces. Sangomas, herbalists, gospel preachers and other people playing an important role in the lives of the residents are always found in the same places, they do not tend to move around.

In Mabopane the pattern is pre-determined and static. Intersections of movement spaces are uninformed and schools are the only activities that could begin to make symbolic spaces over time.

4.7 Malleability

This theory of Crane[19] asks that forms in the urban fabric be of varying degrees of incompleteness or susceptibility to progressive additions and modifications. This theory applies to the Winterveld development, which is in a continual state of change, not only by people moving from one plot to another, and thus changing the built environment by the demolishion and addition of houses, but also by the expansion of existing houses.

In Mabopane the environment remains static since changes in the built environment are governed by regulations. The similar sized buildings were built in a short period of time and have not changed or modified to affect the urban spaces.

4.8 Electability

This theory of Crane[19] states that where a fixed order is necessarily limiting, an alternative kind of environment should be provided elsewhere or nearby. Thus the basis for choice is built into the theory. The Winterveld development is completely governed by choice and/or alternatives since the residents could not only choose on which plot they wanted to locate, but could also decide on the size and form of their houses. The location of each resident's house on the plot, is however, governed by the plot owner.

The residents of Mabopane had to move into the houses as they were completed in the building contract. The people had neither choice in houseplan, all the plans are the same, nor in situation, and no alternatives were available.

Thus electability played and still plays a major role in the development of Winterveld as opposed to Mabopane where it did not fulfill any role.

4.9 Space

Space can be either open or enclosed. In the urban realm, open space constitutes streets, squares and open spaces between buildings, and closed spaces refer to the enclosed spaces within buildings themselves.

Rob Krier[5] describes the urban spaces as follows: internal space shielded from weather and environment is an effective symbol of privacy; external space is seen as open, unobstructed space for movement in the open air with public semi-public and private zones.

According to his observations, urban spaces are almost always identified with the social structure of the residents present at the time in question.

The two basic elements in urban open space-making where the people express their social structure, are in the street and the square, with the house as the expression of their private individual lifestyle in an enclosed urban space. In the latter situation, reference is made to the corridors and rooms. The geometric characteristics of both spatial forms are, however, the same. They are differentiated only by the dimensions of the walls which bind them and by the patterns of function and circulation which characterise them.

Therefore in the Winterveld development, a clear expression of the residents' lifestyles can be discovered, seen and experienced in the patterns of the linear movement spaces and communal outdoor living spaces with their progressional approach to the private indoor living space of the individual family.

Rob Krier[5] states further that these street spaces can only function when they form part of a system in which pedestrian access leads off the streets. Thus it cannot be stated that the street spaces in Mabopane, which were primarily designed for vehicular movement, can be regarded as an expression of people's lifestyles.

It is in this respect, that Fumihiko Maki[2] sees space as an adhesive factor in compositional design of the urban environment. In Winterveld the street spaces fulfill this function, whereas in Mabopane, the street spaces tend to function as physical barriers.

4.10 Defensible Space

Defensible space refers to security in the urban spaces, and especially in the street spaces and squares it becomes an important design tool. According to Oscar Newman[7] the achievement of security in the initial design of housing requires an understanding of factors such as:

i. The security needs and concerns of different types of residential groups;

ii. The use each group makes of its respective home environment;

iii. The capacity each group has to contribute to its own security;

iv. The building types available to meet the needs of different groups at different densities;

v. The design options possible in site planning; and

vi. How these design options interact to maximise residents' control of their living environment.

The following design mechanisms acting both separately and together, contribute towards the creation of defensible space and environments :

i. The assignment to different resident groups the specific environments they are best able to utilise and control.

ii. The territorial definition of space in residential developments, which reflect the zones of influence of specific inhabitants.

iii. The juxtaposition of dwelling interiors with exterior spaces and the placement of windows to allow residents to naturally survey the exterior and interior public areas of their living environments.

iv. The juxtaposition of dwellings – their entries and amenities – with city streets so as to incorporate the streets within the sphere of influence of the residential environment.

v. The adoption of building forms and idiom, that avoid the stigma of peculiarity, which might expose the vulnerability and isolation of a particular group of inhabitants.

vi. The subdivision of residential environments into areas defined for the specific use of small groups, or similar families can increase the frequency of use of these areas, because people can identify with these areas and feel that they have a right to determine the activity taking place there.

Although the residential environment of the Winterveld development was not designed according to a masterplan, but was developed on an ad hoc basis over a relatively short period of time by hundreds of unco-ordinated individuals, the spaces created by them possess all those qualities necessary to create a defensible environment, as expressed by Newman.

All the urban spaces also conform to the same conceptual patterns as if each individual, in building his own house, had worked according to a master plan.

To a certain degree Mabopane development has defensible space, in the sense that each family has a clearly defined property. However, the connection from the house to the street is indirect and the activity in the street space is public, remote and uncontrolled, which makes for a breakdown of defensibility in the street space. Oscar Newman[7] stated that a person's claim to a territory deminishes proportionally as the number of people who share that claim with him increases. The larger the number of people who share a territory, the less is each individual's felt right to it.

The larger the number of people who share a communal space the more difficult it is for the people to identify with it as being in any way theirs, or to feel that they have a right to determine the activity taking place within it.

Thus, by designing street spaces primarily for vehicular movement, the defensibility of these urban spaces diminishes.

4.11 Community

In historic cities community was formed by the integration of production and consumption in a small society where everyone knew each other. The cities usually deve-

loped in a natural way along communication routes and spaces, which brought people daily into face-to-face contact situations, where cultural, work and family life became an integrated whole, and a way of life, which culminated in what is now defined as their lifestyles. Thus the spaces in these cities served to enhance community life.

Christopher Alexander[18] states that modern technology has destroyed this sense of community in cities, and has left deeper scars on the environment than we dare admit. The mechanical comforts and marvels invited into civilised homes are interfering with human lives in the manner of "The man who came to dinner". According to Alexander the urban anatomy must provide special domains for all degrees of community and privacy.

Although Winterveld is a commuter community, a large number of people do not commute, and instead, conduct small scale business and home industry activities in their dwellings, which thus form the basis of an active informal sector. Therefore, in Winterveld, technological development has not yet had the negative effects on community life and the people's lifestyles, as Alexander found in his studies. Paul and Percival Goodman's[17] philosophy of social and economic integrated community life is still very applicable in Winterveld.

Whether, however, it is this philosophy, or the fact that the public urban spaces have been enclosed by built form to form small communal public spaces for 10 - 20 families, that forms the basis for communal life in Winterveld, or a combination of these factors with the general poverty level prevailing, is not completely clear and would require further detailed study.

It is, however, evident that Mabopane has a poorer quality of community life since the street spaces are neither formed, nor used as communal outdoor meeting and living spaces. The general quality of the environment is that of isolated, singular family life which leads to isolated relationships, rather than community life. Thus it seems that Mabopane residents are further removed from the original lifestyle pattern of their historical ancestors than those residents in Winterveld, although they are of the same demographic and social structure, and moved to Mabopane during the same timespan as the Winterveld residents moved to their area.

It appears, therefore, that the spatial structure of Mabopane had the effect of bringing the lifestyles of the people closer to Webber's community without propinquity.[16]

4.12 Privacy

According to Alexander[18] privacy is most urgently needed and critical in the place where people live. It is his contention that to contain the type of dwelling where intruders cannot interfere with the privacy of the family, and to develop the true advantages of living in a community, an entirely new anatomy of urbanism is needed, built of many hierarchies of clearly articulated domains.

In Winterveld's hierarchical order of communication spaces, as well as the progressional spatial approach to the houses, a rich variety of articulated domains with varying degrees of privacy from noise and interference, have been built in a natural way by the people themselves, without any conscious communal or group approach to this factor.

In Mabopane a conscious effort was made to channel unnecessary vehicular noise and movement from some of the street spaces, to create spaces accommodating various levels of vehicular movement. However, the approaches to the houses are of a separate and similar nature which lacks the rich spatial varieties of the Winterveld development. Thus, it is understandable that the Mabopane people's lifestyles are closer to the non-place realm of Webber, which is inappropriate in the context of Winterveld where the residents could build their traditional background into the urban environment.

4.13 Conclusion

The development of urban design theories have not only an historical origin, but also a functional social and communal basis. From this study it is clear that the Winterveld development has most of those qualities on which the discipline of urban design is supported, as well as the area's own inherent unique qualities in the progression of spaces from public to private.

The Mabopane development, however, lacks most of the qualities that are important in urban design. However, it has its own unique qualities which originate from, and relate to the influences and effects of technological development and progress on a global scale. Thus Mabopane is the product of a modern era and a particular set of

political circumstances that do not necessarily answer to those historical developments and principles which form the theoretical basis of urban design.

It also does not take cognisance of the inhabitants' historical past and cultural inheritance which, as expressed in Winterveld, ties in with the historical development of cities and urban design theories.

Melvin Webber[16] in his study into the non-place realm, offered us an understanding of the way in which modernisation has changed the urban experience from direct face-to-face involvement in the environment and community, to indirect communication and experience of life and environments.

Mabopane development seems to be on the brink of the phase of change towards modern technology in having these non-place realms in its urban spaces that Webber describes, although the lifestyles of the people are still representative of global historical cultures and those disciplines that governed space-making in the urban environment, which modern technology has erased.

As Fredrick Gutheim said :

> "In its form, the community more broadly should find those perceptions and social values which support strong family and community activities and are fundamental to a workable urban society and a strong urban economy." (Gutheim, 1963, p. 129.)

Therefore, there is a need for a design approach in the present modern technological age which will allow the recreation of a true urban environment, with meaningful spaces, such as those found in Winterveld.

CHAPTER V

APPLICATION OF A DIFFERENT SET OF DESIGN PRINCIPLES AND STANDARDS TO A NEW STUDY AREA

The study area which was chosen for the application of a new and different set of design principles and standards, forms a wedge between Winterveld and Mabopane, and has the same topographical characteristics of both these areas. The objective is to use those principles and elements found to be present in the Winterveld development and combine them with similar standards and norms than those applied in the development of Mabopane to design and develop a meaningful urban environment, as future expansion of Winterveld and Mabopane. The accepted design standards and norms are listed in the following paragraph and the design application on Plans 5.1 – 5.7, 5.10 – 5.13 and 5.20 – 5.28.

5.1 Accepted design standards and norms.

Density	20 dwelling units/ha
House types	individual choice
Public movement spaces	NBRI norms
Schools	Site size
1 primary school/600 families	2,5 ha
1 secondary school/1 800 families	5,0 ha
1 creche/300 families	300 m^2
Religion	
1 church site/300 families	1 000 m^2
1 community Hall/600 families	1 000 m^2 or use of the school hall

Infrastructure

Design for ultimate full waterborne sewage, full water reticulation, electricity reticulation, stormwater and surfaced roads, if so required.

Recreation:

1 ha. open space for parks and sportfields/1 000 persons.

Other activities:

1. Any business or small industrial activity can locate along the central spine road.
2. Any business or small industrial activity can be practiced on any site provided that it does not exceed 200 m^2 in size.
3. Any communal activity can be exercised on any chosen location

5.2 Design Approach

The approach is to design for community involvement with public sector assistance in creating an urban environment for the new generation growing up in Winterveld and Mabopane.

The design of the urban environment of Winterveld 2 is aimed at providing an overall development framework similar to Crane's[19] concept for the Dynamic City within which the individual residents can move around, to build and develop their immediate home environment, as well as take part in developing their neighbourhood environment. The development framework does not provide detail design, but stops at the level where the spatial movement pattern can be fixed on the ground, with minimum required widths of public movement spaces, and an overall urban concept. Detailed principles on the following are built into the framework:

1. Recommended residential densities for minimum requirements for public spaces, as determined in the framework.

2. The standard of services infrastructure, provided with an upgrading programme to full standards, as developed in Mabopane.

3. Landscaping and planting.

4. The accommodation of the motor vehicle and the pedestrian.

5. The treatment of public spaces.

6. House placings and the treatment of privately owned spaces.

7. Guidelines for landmarks.

A system of overlays has been adopted to facilitate the final design. On plans 5.1 – 5.7 the overall movement and activity pattern for the Winterveld 2 study area have been developed to the stage before detail design of the internal detailed framework.

On plan 5.10 – 5.13 the detail communication network and activity pattern have been developed according to those principles present in Winterveld but with the spatial standards of the NBRI.

Detail design areas A and B, as indicated on plans 5.20 – 5.28 illustrate the manner in which the residential environment could develop in areas with internal primary and tertiary public spaces.

The objective is that formal design should stop at the level of plans 5.20 and 5.21 and that the residents, with guidance from the institutional support service, as suggested in later paragraphs create their own urban spaces with self-built structures and elements. The institutional support service interprets and assist the residents to impliment the principles for development as well as advise them on how to improve the quality of their built structures and elements.

5.3 Development Principles

In developing a Winterveld 2 environment the important broad development principles are as follows:

1. Infrastructure, and all public services should be accommodated within the cadastral framework delineating the minimum sizes for public spaces.

2. Individuals create and build their own private and semi-private environment.

3. The public sector develop and build public spaces, elements and buildings with the residents' involvement.

4. More permanent building standards should be achieved than exists in Winterveld.

These principles can be realised by adopting the following approach :

1. Pre-determine the minimum spatial requirements of the movement system and define this by means of a surveyed cadastral framework.

2. Assist individuals in building their own houses, to more advanced standards of construction, and to fit in with the overall environmental design concept and principles.

3. Make trees available to families, and arrange planting programmes to educate them on how to use plants, as part of their living environment.

4. Design public facilities for educational, medical, recreational and other social activities, in accordance with the needs of the residents, and have these built by the public institution in collaboration with the residents.

5.4 Development Strategy

The strategy to develop Winterveld 2 is based on the self building principle of Winterveld with assistance from the public institution in the development of infrastructure and facilities. The public institution, to provide technical assistance to the residents, and to guide them to achieve the overall urban concept by implementing the principles for the development, has to be established and maintained by the government on the terrain which is to be developed. The function of the institution is:

1. To arrange for the construction of affordable services infrastructure, funded by the government, in the public spaces, as and when required by the *residents*.

2. To assist the prospective *residents* to build their own houses.

3. To implement the recommended principles of the development framework, by advising the *residents* on how to develop within the framework of the urban concept.

4. To assist the *residents* in achieving higher built standards.

5. To initiate planting programmes with the residents to develop their private as well as immediate public environment within the framework of the urban concept.

6. To involve the residents in the development and building of social infrastructure (part of the financial programme of the public institution in their neighbourhood like schools, recreational facilities, clinics, etc.

It is therefore clear that the development of the proposed Winterveld urban environment is not exclusively a singular public sector activity. It is a process incorporating an overall involvement of the residents, in the creation of their immediate and communal urban environment, within a development framework prepared through the medium of urban design.

"If urban design is to fulfill its role to make a contribution to the form of the city, it must do more than simply organise mechanical forces, and make physical unity from diversity. It must recognise the meaning of the order it seeks to manufacture, a humanly significantly spatial order." (Maki, 1964, p.29.)

WINTERVELD 2
DESIGN AREA

MABOPANE

WINTERVELD
SITE AREA

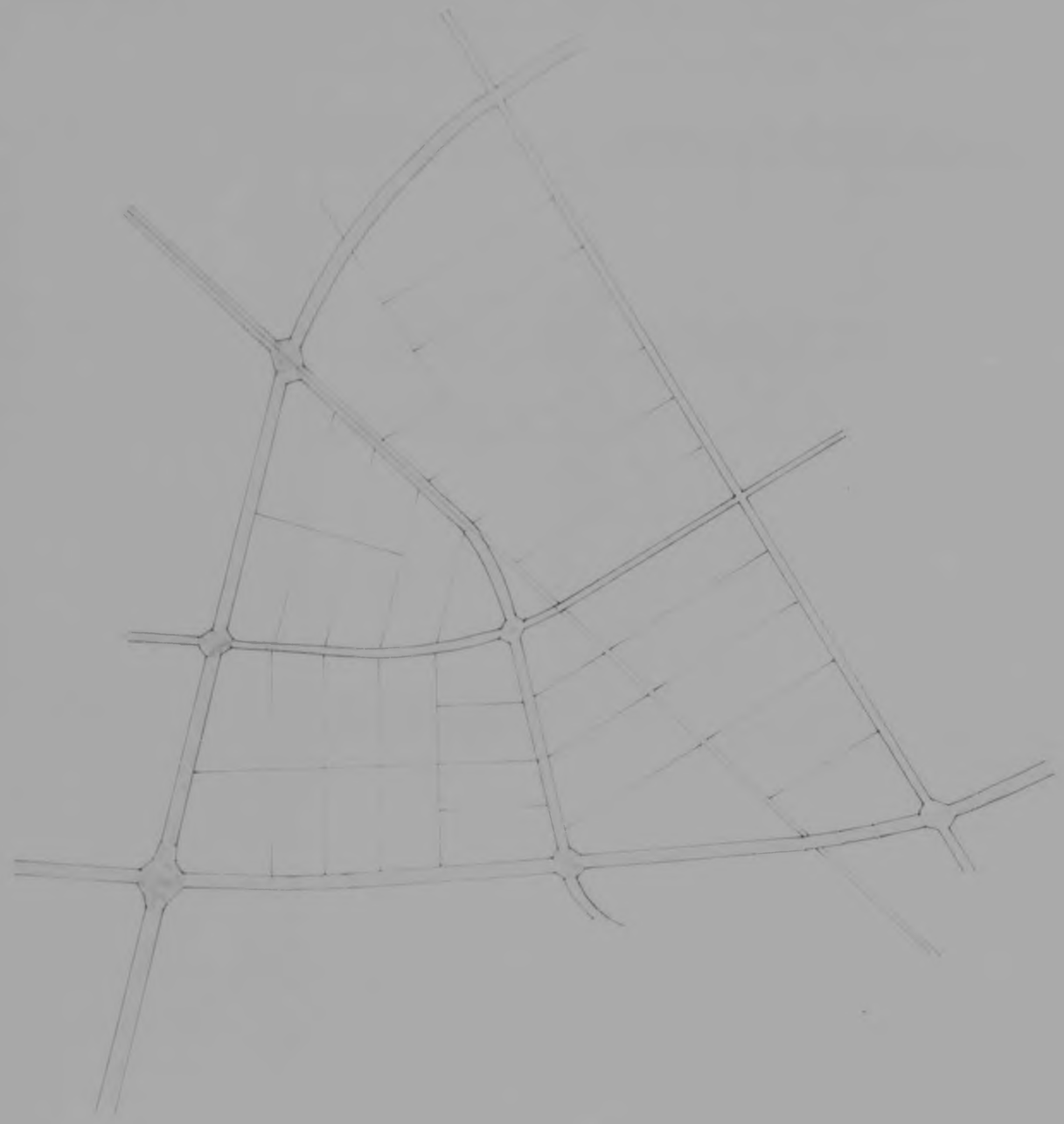
WINTERVELD

5.2



WINTERVELD 2

200 0 200 400 600 800m



WINTERVELD 2

PINLAY CADASTRAL FRAMEWORK

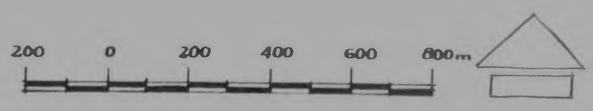
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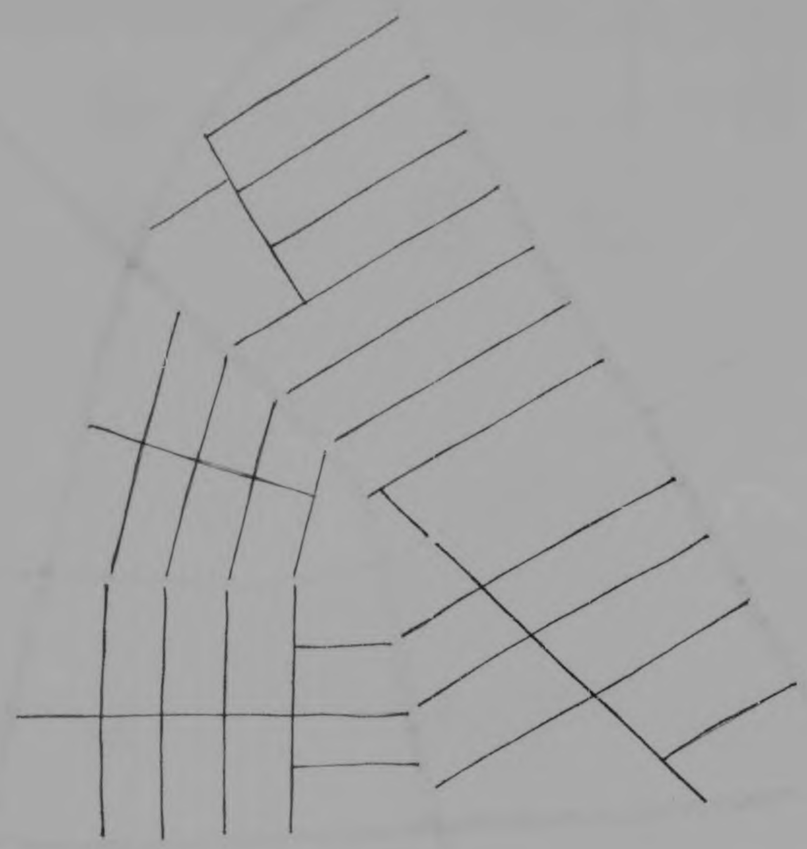
5.4

VEHICULAR MOVEMENT CONSTRAINTS



WINTERVELD 2

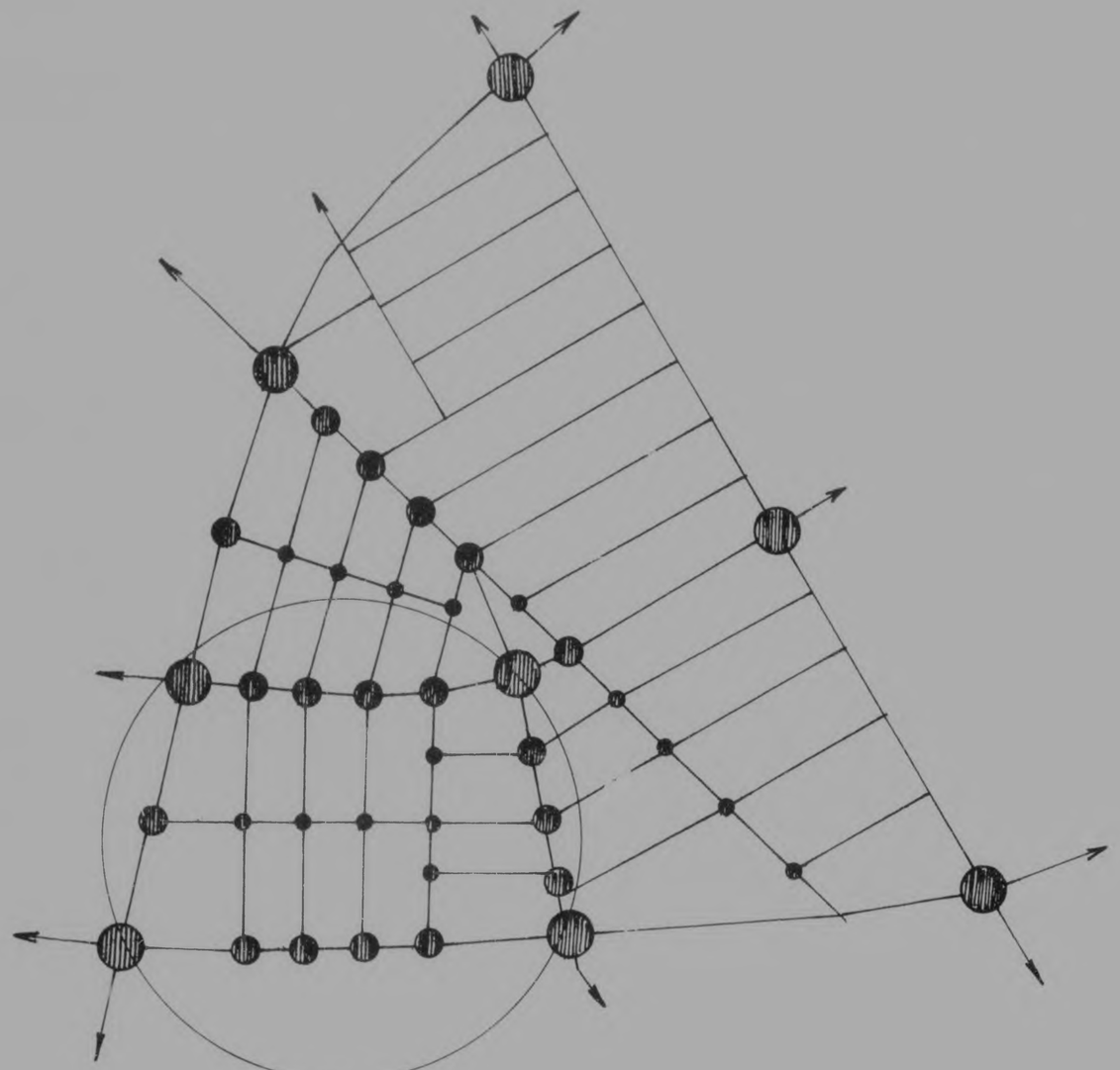




WINTERVELD 2

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5.6



REFERENCE

Primary Activity Node
activities dependent on vehicular movement

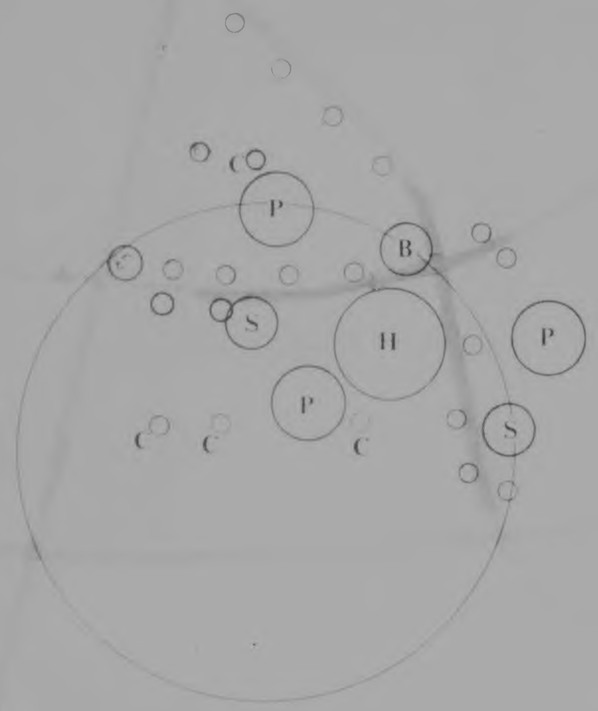
Secondary Activity Node
commercial and business activities

Tertiary Activity Node
community activities

MAJOR ACTIVITY PATTERN

WINTERVELD 2

200 0 200 400 600 800m



REFERENCE

B — Larger commercial activities

H — High school

P — Primary school

S — Sport fields

G — Garage

C — Church Creche

C — Community hall Clinic

○ — Corner shop

WINTERVELD 2

200 0 200 400 600 800m

Author Janse van Rensburg E G
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