

DEVELOPMENT IN CAPE TOWN'S CENTRAL BUSINESS DISTRICT -
THE OFFICE COMPONENT

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Cape Town
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T.W. Rideout

ABSTRACT

The first part of the thesis covers the background to the research, namely (a) a selective review of previous work in the field of office development and location studies and the subsequent identification of the objectives of the present research, (b) a summary of the historical development of the central area of the City of Cape Town, (c) the definition of the study area, this being the Central Business District of the city of Cape Town and (d) a discussion of the collection of land use and gross floor area data, the identification and resolution of problems in the data and the administering of a postal questionnaire to 1,400 office establishments in the CBD. This section also covers the problem of identifying and delimiting land use clusters. The technique selected for use in such delimitation was that developed by D.H. Davies (1965) augmented by the development of three 'indices of clustering'.

The second part of the thesis presents, by means of thirty-three detailed maps, a comprehensive analysis of office land use patterns in the Cape Town CBD in 1983. Clusters are indicated according to the Davies technique. It was found that many office functions exhibited clustering in distinct parts of the CBD and, moreover, certain functions appeared to show close similarities in their respective location patterns. A factor analysis identified six groups of similarly located land uses, on which basis a model of the spatial organization of the CBD was proposed. Data, derived from the postal questionnaire, on the characteristics and requirements of individual office functions was used to explain the location patterns. Previous studies have usually considered linkages as being the primary locational determinant for the office sector, but in this case it was found that clustering and the existence of similar location patterns between office functions usually arose from a combination of common locational requirements. The major locational determinants were found to be the rent paying ability of establishments, the relative importance of the accessibility of the establishment to either general public or commercial clients, the existence of strong linkages with other functions (especially where such functions were eccentrically located with respect to the CBD, such as the Docks) and in some cases the importance of occupying prestige premises. The comparatively minor role of linkages with other functions was considered to be a reflection of the relatively small size of the CBD.

The thesis concludes with a study of past trends and future projections of the development of the CBD. The growing dominance of the office sector is clearly revealed, as is the effect of the Foreshore Reclamation Scheme in promoting a northward migration of the Office Core while leaving the Retail Core largely unchanged from its 1957 location. On the basis of current development projects it was projected that there would be considerable short-term vacancy in the office sector by late 1986. In the longer term, though, gross floor area requirements for all uses are predicted to rise by almost 50% to 3.475 million square metres by the year 2000. Such development of all of the space currently permitted by the Town Planning Scheme, raises the possibility of space shortages and the loss of remaining historic buildings.

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CHAPTER 1

AN INTRODUCTION TO OFFICE LOCATION STUDIES

The aim of this thesis is to present a detailed analysis and interpretation of the location of office land use in the Central Business District (CBD) of Cape Town, and to examine growth trends and possible future development patterns to which that land use may be subject. In this chapter the concept of an office is reviewed, the importance of office activities in the contemporary economy is demonstrated, and a review of the work undertaken to date on the office sector will be undertaken. Details of the aims and objectives of the study are set out in conclusion.

THE OFFICE SECTOR

Daniels (1975, p4) suggests that "the minimum function of an office is to direct and co-ordinate the activities of an enterprise." The office function is said to consist of:

- 1) Receiving information from various sources,
- 2) Recording the information received,
- 3) Arranging the information in an easily accessible form,
- 4) Providing the information to those needing it, and
- 5) Safeguarding the assets of the enterprise (Daniels, 1975).

Unlike other forms of economic activity, offices deal primarily in intangible goods and services, and exist either as independent establishments or as components of establishments of other activities.

The nature of the office function thus gives rise to a fundamental problem in the study of office land use. Daniels (1975, p4) notes that whereas "the functional definition of an office is fairly straightforward ... its physical characteristics are more difficult to isolate."

The problem rests primarily on whether or not to incorporate in such a study offices that form a component of the activities of establishments of other functions, as for example in the case of a backroom office in a shop. Daniels (1975, p5) suggests that offices should be "considered as premises whose sole use is to be used as an office for office purposes." This is the light in which office land use has been considered in the present study. Thus all office space forming a component of establishment of non-office functions was excluded. A further definitional problem encountered in the study concerned space manifestly created for use by office functions, but occupied, for example, by a tailor located above ground floor level in a multistorey block. For convenience such space was incorporated within the office land use category, whether or not such land uses met the functional definition of an office. The land use classification adopted in the present study is discussed in Chapter 4.

THE DEVELOPMENT AND IMPORTANCE OF THE OFFICE FUNCTION

Throughout the early history of the city offices played a minor role in the functional activity of the urban economy (Daniels,

1975). It was only during the course of the Industrial Revolution that the growing scale and complexity of industry led to the emergence of a need for specialised management and communications activities. Specialist functions emerged in response to industrial growth, including such activities as Finance and Insurance Companies. These activities occupied some of the earliest examples of premises used solely for office purposes (Daniels, 1975). Most offices, however, remained small and in general were attached to industrial plants.

It was the development in the late 19th century of office machines in particular, that hastened the establishment of a separate office function in the urban economy. The telephone, typewriter and duplicator appeared from 1874 and greatly facilitated an increase in the flow of information and in particular communication on paper (Daniels, 1975). Concomitantly building technology, which included the development of the lift (first installed in New York in 1857), and steel frame construction (first used in Chicago in 1885), permitted substantial vertical expansion of urban space (Daniels, 1975, p18). The burgeoning office function found its accommodation in new office towers which, over time, have come to dominate the form of the central city areas of modern cities. By 1900 buildings in New York reached upto 20 storeys, 60 storeys by 1913 and 100 storeys by 1932 (Daniels, 1975, p19). By the 1930's the symbol of the city had become the office skyscraper which was "displacing the industrial plant and the factory chimney" (Cowan

et al, 1969, p35).

In the period since the Second World War the growth rate of the office sector in the urban economy has been maintained. Daniels (1975, p1) describes the growing importance of non-industrial or 'white collar' employment "as 'the quiet revolution' which has been underway since the turn of the century" in all large cities throughout the world. Extreme examples include Greater London, in which office floor space grew from 271 million square feet (25.2 million square metres) in 1961 to 317 million square feet (29.5 million square metres) in 1971 (Daniels, 1975, pp55-57) and Manhattan, which added 30 million square feet (2.8 million square metres) of new office floor space in 1969 alone (Daniels, 1975, p1) to reach a total of approximately 310 million square feet (28.8 million square metres) of office floor area by 1975 (Daniels, 1975, p58).

In assessing the implications of the growth of the office function for city structure, Daniels has noted that its significance "extends far beyond its implications for occupation structure, female activity rates or Gross National Product, in that most of it has been concentrated within small areas inside major cities, particularly the Central Business District" (1975, p1).

The growth trend of white collar employment in South Africa has followed the growth patterns experienced in other western countries. In 1960 586,828 persons in South Africa were employed

in Professional, Technical, Administrative, Managerial or Clerical occupations (South Africa, 1975, pl). The figure represented 10.3 per cent of the total economically active population. By 1970 1,006,442 persons were employed in these occupations (South Africa, 1975, pl) and comprised 12.4 per cent of the total economically active population in that year. The annual compounded growth rate of activities which may be described as office functions over the period was 5.5 per cent. In the Cape Town Metropolitan Region a total of 120,627 persons (South Africa, 1977, pl) were employed in Professional, Technical, Administrative, Managerial or Clerical occupations in 1970 (South Africa, 1977, pl), comprising 25.8 per cent of the economically active population of the metropolitan region in that year. This represents a compounded annual growth rate of 5.1 per cent over 1960 employment in such functions of 73,730 (South Africa, 1966).

THE ROLE OF THE CAPE TOWN CBD

The Cape Town CBD, as is the case for any city is of vital importance in the economic structure of the region it serves. It is the locus of a high proportion of retailing, financial and other office functions of the region, and the organising focus of much of its economic activity. By world standards the economy of the South Western Cape is of modest scale, and in conformity the Cape Town CBD is of moderate size in comparison to those of many American or European cities. In 1975 it was estimated that the

'Central City' (approximating to the CBD) employed 116,050 persons in all land uses, or 20.3 per cent of the total metropolitan employment (City Engineer, 1980, vol 4, pp11-12). In 1982 property in the 'Central City' was valued at an estimated rateable value of R 907 million (Rideout, 1982, Appendix 2). That total represented 27 per cent of the total value of all property in the Municipality of Cape Town, and the 'Central City' was thus by far the most important single source of rates income for the municipal authority.

The importance of the Cape Town CBD as the focus of the urban economy is unquestioned. Equally, recurrent studies of the functional and spatial behaviour of the CBD and of its individual functional components are of substantial importance to authorities responsible for, or with an interest in, the planning and development of the city. This thesis focuses on the office component of the Cape Town CBD which, in 1983, occupied almost 69 per cent of the total Gross Construction Area of the CBD (see also Chapter 4 and Chapter 7).

STUDIES OF THE CBD AND THE OFFICE SECTOR

The concept of a Central Business District derived from the thesis of Burgess, proposed in 1925, that urban land use tended to display a zonal organization concentrically arranged about the city centre or CBD (Carter, 1981). The concept of the CBD has subsequently remained a component of urban land use models.

Early work on the internal structure of the CBD was undertaken in New York by Haig (1926). Haig noted that "certain advantages ... flow from a cohesion of functions in a given district, and the result is a number of specialised centres with definite unities of interest rather than a single diversified centre" (1926, p418). He went on to speculate on possible reasons for the concentration of Financial Offices in the Wall Street district.

It was, however, not until the 1950's that detailed work to define the CBD was undertaken by Murphy and Vance (1954). That work led to a renewed interest in identifying and understanding the internal structure of the CBD in general terms and has subsequently given rise to work focussed on its individual functional components, of which the office sector is one.

In a significant study, Rannells (1956) examined the land use pattern in the CBD of Philadelphia. It was found that:

"each different kind of business ... has its own pattern of distribution, and related congregations of them tend to congregate in more or less distinct centres, each a somewhat different area, none too definite as to extent and always overlapped by others" (Rannells, 1956, p55).

Rannells went on to identify factors which influence the location of establishments. Among these was linkage and interaction between establishments. Rannells defined a linkage as "a relationship between establishments characterised by re-

current interactions which require movement of persons or of goods or the exchange of information" (1956, p19). It was noted that "organizations choose locations for their activities where they will find suitable accomodation, services and facilities as well as the associated activities of closely linked establishments or 'the market' which their operations require" (Rannells, 1956, p54). Rannells' findings suggest that establishments choose locations in terms of the physical condition of the premises, proximity to linked establishments and accessibility to the market. Thus "activities which require contact with people tend to cluster in areas which have the best mass transit facilities or where there is heavy pedestrian traffic" (Rannells, 1956, p148). There is, though, a further constraint in that rentals also influence location patterns, so that "only those establishments whose activities can support high rents can pay for good central locations" (Rannells, 1956, p150).

Davies (1965) applied the Murphy and Vance delimitation technique in the Cape Town CBD and went on to develop further techniques for identifying clusters. Although it was demonstrated that there was some tendency toward the development of distinct functional zones of groups of CBD land uses, Davies allowed "his study to end rather inconclusively, neither following up the concept of linkage which he introduces, nor the historical emergence of the areas identified" (Carter, 1981, p212). Davies' technique has also been used by Beavon (1969) to delimit land use clusters in the Port Elizabeth CBD, Dewar (1970) to delimit

clusters in the Frame of Cape Town, and Piper (1974) to delimit clusters in the Durban CBD. Like Davies, though, these studies have not sought to progress beyond the delimitation stage.

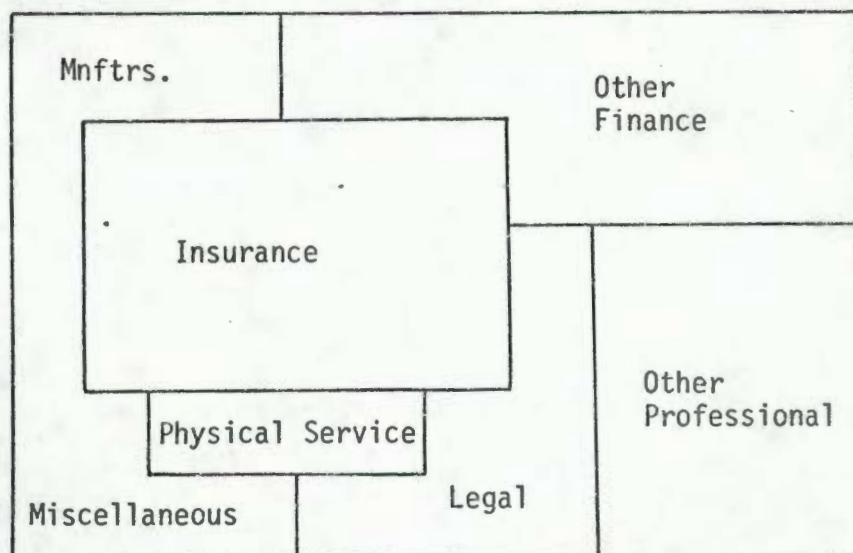
During the 1960's, research on the office sector expanded particularly in Britain where the impetus was provided by attempts by government to encourage decentralisation of offices and industry from London. Goddard (1967) examined changes in locational patterns of selected land uses in central London, concluding that "it would seem that firms are less tied to particular parts of the centre than in the past." (Goddard, 1967, p283). In 1968 Goddard carried out a more detailed analysis of office location patterns in the City of London. A variety of multivariate techniques, including Factor Analysis, were used to demonstrate that "sets of closely linked activities can be found grouped together in particular parts of the city" (Goddard, 1968, p81). Although it was maintained that "linkages between different offices that demand that the linked firms be located in close proximity in the city centre are the focus of this study" (Goddard, 1968, p70), the paper did not actually address the question of functional linkages. It examined only spatial proximity of particular land uses, or spatial linkage as Goddard termed it, and assumed that such locational proximity was the result of functional linkages.

Croft (1969) examined functional linkages in considerable detail in his study on office location in Leeds. The major objective of the study was to establish bases upon which the office function

in the city could be encouraged to decentralise. In analysing the concentration of land uses in the CBD, a model designed to optimise the location of various office land uses in the CBD was proposed. The model was based on minimising the distance separating the most strongly linked land uses, and is illustrated in Figure 1.1 below.

FIGURE 1.1

OPTIMUM OFFICE LOCATION MODEL FOR THE CITY OF LEEDS



Source: Croft M.J., 1969: Offices in a Regional Centre - Follow Up Studies on Infrastructure and Linkage, LOB, Research Paper No 3, p53.

Croft, however, made no attempt to examine the actual spatial distribution of particular office land uses, nor were locational influences other than linkages introduced in the model.

In a study designed to further penetrate the locational qualities of offices in Central London, Cowan (et al, 1969) undertook a questionnaire survey in part to determine why

establishments regarded their particular locations as preferable. The first five reasons given by respondents in the survey were proximity to clients, proximity to a specified place, centrality, reasonable centrality and good communications. The level of the land or property rent was placed eighth, with prestige gaining the lowest number of mentions.

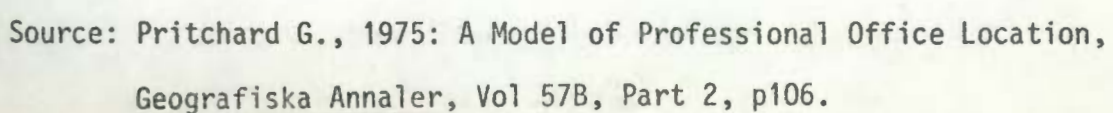
Davey (1973) also examined the reasons for locational decisions, in a study of office location in Wellington, New Zealand. It was found that "'Commercial' and 'Transport' firms ... tend to be less concerned with centrality (, while) 'Financial', 'Professional' and 'Miscellaneous' firms see centrality and the facilities of modern premises as their main advantages" (Davey, 1973, p132). "Nearly half the interviewees considered that staffing was a major influence on locational decisions" (Davey, 1973, p122). It was suggested that staff would not be retained unless they had access to shops and other amenities. "Access to, and ease of making contacts were seen as major influences upon locational decisions by 82 per cent of those interviewed" (Davey, 1973, p123), while the cost of land, condition of buildings and prestige were factors which were also mentioned. Further studies of this type have been undertaken more recently, for example, by Edgington (1982) in a study on changing patterns of office activity in Melbourne, Australia. Notwithstanding the contributions which these studies have made, Daniels (1983) points out that few studies have been "concerned with the development of models or constructing a theory of office location" (1983, p3).

Two exceptions have been studies by Pritchard (1975) and O'Hara (1977). Pritchard (1975) specifically attempted to develop a model of professional office location. He noted that 'births' of office establishments were more evident in purpose built premises near the centre of the CBD than elsewhere, and that all offices were tending to locate at a greater average distance from the centre over time. On that basis a model was developed in which new firms located near the centre of the CBD and gradually migrated outward as they grew larger over time. The model is illustrated in Figure 1.2 from which it will be observed that Pritchard suggested that both average gross floor area and average rent would tend to increase toward the CBD periphery.

O'Hara (1977) sought to model the location of firms within an idealised square CBD. It was assumed that all the firms fulfilled the same function and had face-to-face contact linkages with all the other firms. All the firms wished to locate so as to minimise transport costs. The somewhat elementary conclusions were that the rent function was concave from below and generated circular rent contours about the peak land value intersection. This model does not in essence extend existing knowledge of the CBD.

THE AIMS AND OBJECTIVES OF THE PRESENT STUDY

The objectives of the present study are as follows:



- 1) To describe the historical context in which the present day CBD has developed, and in particular to identify trends of significance to both overall future CBD growth and the development of the office sector specifically.
- 2) To determine the total Gross Construction Area (GCA) available within the CBD in 1983, and the proportions occupied by individual land uses. The office sector is to be considered in terms of a finely detailed classification, and other sectors in broad outline.
- 3) To identify and describe the land use distribution patterns of individual office land uses, and to determine the relative degree of clustering present in each pattern.
- 4) To use an appropriate technique to analyse the land use data collectively to test for the presence of distinct functional zones within the CBD. The identification of functional zones may be used to assist in the development of a model of land use location in the CBD.
- 5) To use the locational forces identified by previous studies as influencing locational choices as a basis for explaining individual office land use location patterns. Information on the relative importance of these locational forces and other factors was to be collected by means of a questionnaire survey.
- 6) To identify trends in the development of the CBD by means of comparison with an earlier study undertaken by Davies (1965) and a reconstruction of the 1970 GCA distribution.
- 7) To use such trends to project the likely future development

path of Cape Town's CBD. Attention is to be given to considering overall CBD growth, the growth of individual land uses and the likely locational characteristics of CBD growth.

The discussion is arranged in the following manner. Chapter 2 covers the historical context. The chapter also identifies significant historical trends. Chapters 3 and 4 deal with the methodology of the study. The chapters cover the definition of the study area and the execution of the land use and questionnaire surveys respectively. Chapters 5 and 6 contain the discussion of the office land use patterns and hypothesised explanations thereof respectively. Chapter 7 covers projections of future development trends and the implications of these. Chapter 8 concludes the study with a presentation of the most significant findings.

CHAPTER 2

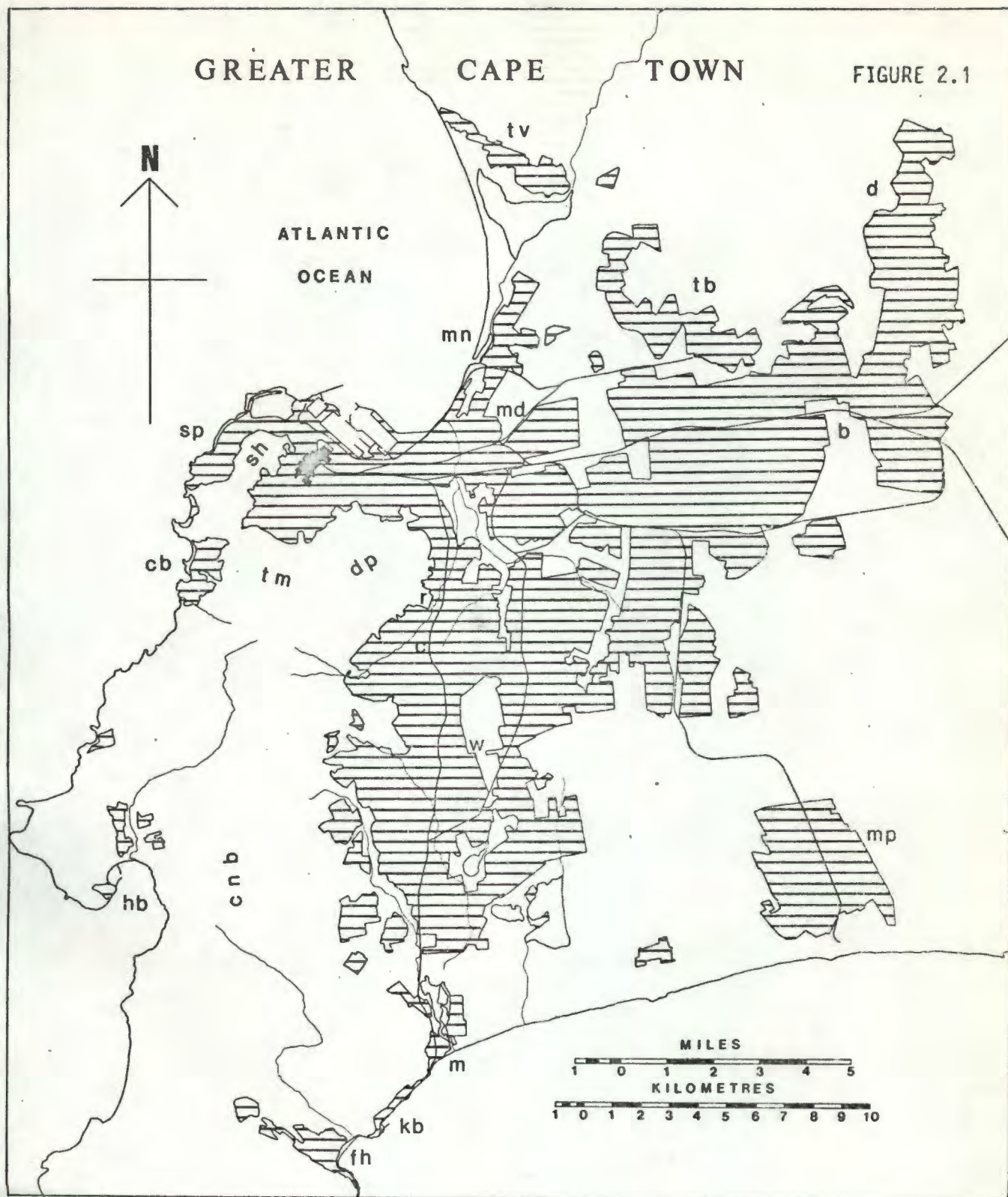
HISTORICAL DEVELOPMENT OF CENTRAL CAPE TOWN

Central Cape Town comprises the Central Business District (CBD), generally characterised by high rise buildings, higher order retailing and office activities, the surrounding Frame or Transition Zone (Griffin and Preston, 1967) of light industry, wholesaling, warehousing and low order retailing interspersed with a variety of residential types, and beyond, a homogeneous residential zone of relatively higher quality. This central area, the historic core of metropolitan Cape Town, occupies an amphitheatre surrounded by the physical boundaries of Table Mountain to the south and Devil's Peak and Lion's Head to the east and west respectively, as shown in Figure 2.1.

Redevelopment decisions, the choice of a location and the determination of planning policy, to mention a few, are all made in the context of the city at the time, so that it is necessary to have a knowledge of the various developments and other significant factors which combine to determine this context at any given moment. Although all the periods of development discussed below are represented in the present day built environment of the central city, the majority of buildings date from the latter periods, so that the emphasis in this chapter is on the more recent history of this area (see Figure 7.7 for the periods of construction of the buildings in the study area).

GREATER CAPE TOWN

FIGURE 2.1



sh Signal Hill
tm Table Mountain
dp Devil's Peak
cnb Constantiaberg
tb Tygerberg
tv Table View
mn Milnerton
md Maitland
d Durbanville
b Bellville

Relief
Features

sp Sea Point
cb Camps Bay
r Rondebosch
c Claremont
w Wynberg
hb Hout Bay
mp Mitchell's Plain
m Muizenberg
kb Kalk Bay
fh Fish Hoek

— Railway Line

 Built Up Area

Source: South Africa 1:50,000 Trigonometrical Survey sheets:
3318CD Cape Town, 5th ed, 1980; 3318DC Bellville, 5th ed, 1979;
3418AB & AD Simonstown, 4th ed, 1981; 3418BA Mitchell's Plain, 4th ed, 1981.

EARLY GROWTH - 1652 TO 1860¹

The history of Cape Town and of its central area begins in April 1652 with the arrival in Table Bay of an expedition of the Dutch East India Company charged with the establishment of a victualing station to provide water and fresh produce to ships on their way to the East Indies. Initially the station consisted of a fort and vegetable gardens. The wood and earth Fort de Goede Hoop was built on a then beach side site now occupied by the Cape Town post office and Grand Parade². At that time the fort was located on the east bank of the Fresh River about 185 metres (200 yards) from the shoreline.

Extensive vegetable gardens were laid out upstream and to the south-west of the fort, irrigated, particularly during the dry summers, by water drawn from grachten (canals) fed by the Fresh River. The first town plots were granted in Cape Town in 1659 (Honikmann, 1966, p21) on which discharged Company servants built their homes. Intending farmers were allocated land along the Liesbeck River beyond Devil's Peak sheltered from the strong south-east winds that affect Table Valley. Others built homesteads on the lower slopes of the mountain around the Company gardens. The first retail and service activities were provided by the settlers of a hamlet, named Het Vlek, located immediately

1 The section on the history of Cape Town from 1652 upto 1957 is drawn from the account in Davies (1965, pp6-11). Additions have been made where these were considered necessary.

2 Some remnants of this fort were uncovered during the later part of 1983 during the construction of new fruit stalls on the Grand Parade.

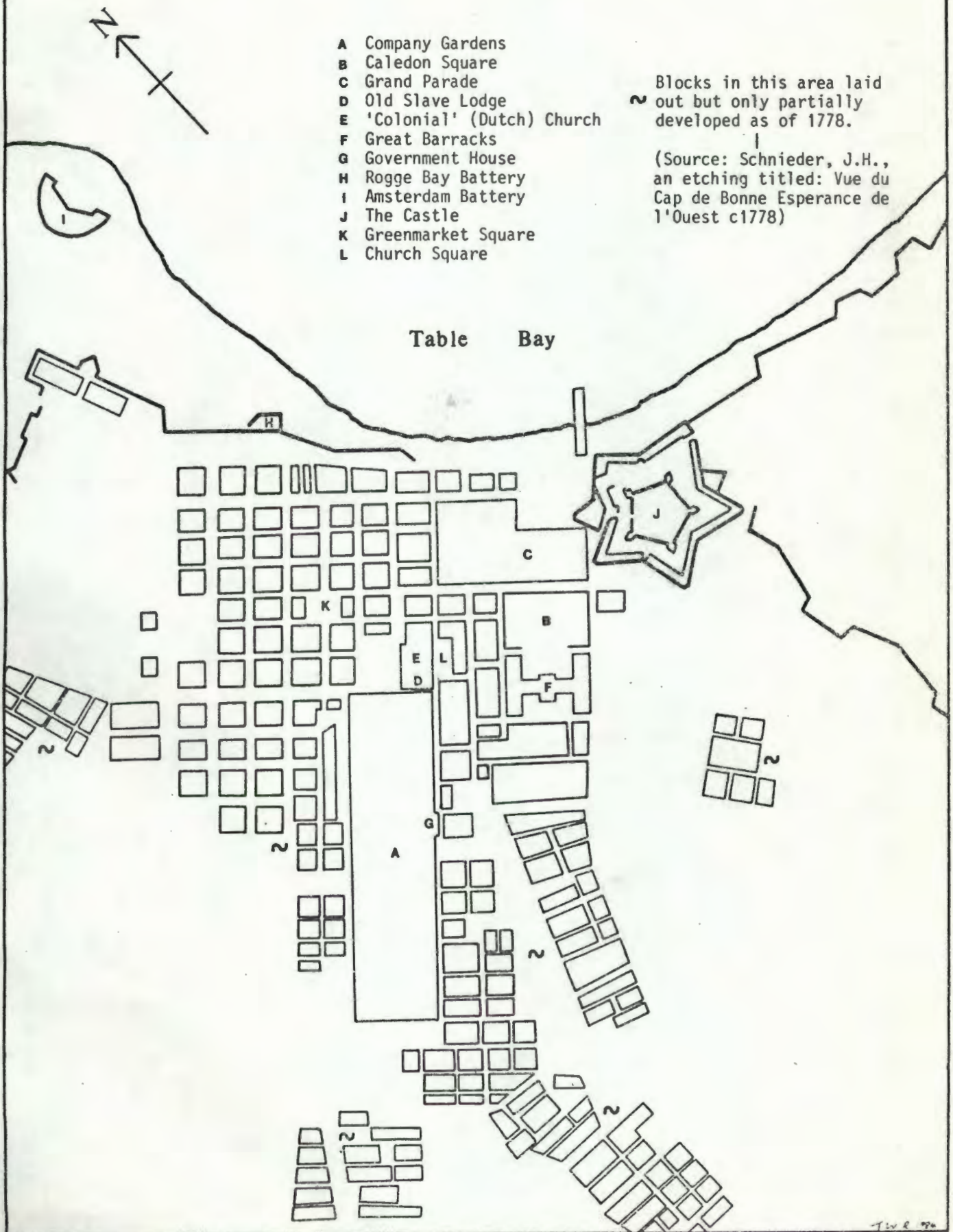
across the Fresh River from the fort, the street pattern of which remains today within the rectangle formed by Adderley, Burg, Longmarket and Waterkant streets, which may be seen in Figure 2.2.

The principal axis of the settlement was the Heerengracht (now Adderley Street) and led from the Company gardens to the shore and a jetty near the fort from which the ships were victualled. This and some parallel streets were made wide enough to accomodate wagons in order to facilitate the movement of produce from the Company gardens. The cross streets were narrow and little more than footpaths leading to the Heerengracht, with the exception of Keisersgracht (now Darling Street) and lower Wale Steet, which had grachten, and Strand Street, along which stone from quarries on Signal Hill was transported for the stone castle constructed to replace the fort between 1666 and 1679.

At the turn of the eighteenth century the large expanse of land between the Castle and the Heerengracht was levelled. The space served variously as a parade ground, promenade and market, while Company storehouses and abattoirs were built along its seaward edge. As the provisioning of ships became increasingly undertaken by outlying farms, parts of the Company gardens were used for public buildings, forming the nucleus for the present cluster of such buildings around the southern flanks of the Central Business District.

The town remained within the boundaries of the sea, Buitengracht, Buitensingel, Roeland and Buitenkant Streets until about 1780

Cape Town circa 1785 FIGURE 2.2



when a rapid increase in the size of the garrison led to expansion beyond this area (Honikmann, 1966, p24). The Dutch East India Company, however, went bankrupt in 1795 in the same year that Great Britain occupied the Cape (Honikmann, 1966, p31). After a short return to Dutch rule (1803 - 1806), the colony was formally ceded to Britain in 1814 (Honikmann, 1966, p32). Gradually, the distinctive ' Cape Dutch ' houses were replaced by commercial buildings. More land for public buildings was taken from the old Company gardens, including sites for the Anglican cathedral after 1827, for the South African College (later to become the University of Cape Town) in 1841, and later for the Public Library. Throughout this period the central area evolved slowly with the function of the settlement remaining basically unchanged. The first formal census of the Cape Colony in 1865 enumerated the population of Cape Town at 48,862 persons within the present day boundaries of the municipality (Petermann, 1868, pl7).

GATEWAY TO A DEVELOPING HINTERLAND - 1861 TO 1938

During the 1860's Cape Town experienced a marked change in both the tempo and the nature of growth. Work began on a railway line to the inland towns of Stellenbosch and Wellington in 1860 and to the village of Wynberg, in what are now the southern suburbs, shortly afterward, but it was the discovery of diamonds in the northern Cape in 1867 that initiated the transformation of old Cape Town. This was followed by the Witwatersrand gold rush of 1884-6 and thereafter by the opening up of Rhodesia. The railway was extended rapidly from its terminus fronting on Adderley

Street and the eastern flank of Strand Street, to reach Kimberley in 1885, Pretoria in 1893 and Bulawayo in 1897 (Day , 1963, pp26,32 & 84). The result was that Cape Town changed in a generation from a victualling station to the main port of a vast subcontinental hinterland and of an emergent nation.

The city now grew rapidly as ribbons of suburban housing, served by public rail and road (tramway) services, reached out between the mountain and the sea and then spread rapidly on easier terrain beyond connecting up the municipalities of Woodstock, Mowbray, Rondebosch, Claremont and Wynberg. These suburbs followed the railway along the fertile granitic soils of the piedmont slope of the peninsula mountain chain to Simonstown, skirting the sandy wastes of the Cape Flats to form the 'Southern Suburbs'. A similar ribbon developed later along the main inland railway line and adjacent road cutting across the northern Cape Flats in an easterly direction to the slopes of the Tygerberg forming the 'Northern Municipalities'. Suburban expansion also occurred along the Atlantic coast northward in the municipality of Milnerton and south-west along a coastal terrace in the Green and Sea Point municipality.

Although little lateral expansion was possible in the Table Valley amphitheatre, hemmed in between the mountain and the sea, commercial activities expanded rapidly in the CBD by displacing residential land use. Warehouses, workshops and railway sidings proliferated along the waterfront. In 1860 (State of South Africa Yearbook, 1974, p14) the first substantial harbour works were

begun in line with Signal Hill and these were later extended with the addition of the Victoria Basin. A railway goods line was laid across the seaward end of Adderley Street to serve the dock and a goods handling area developed inland from it, thereby initiating the process of isolating the city centre from the sea.

Meanwhile the advent of municipal government in 1840 was followed by the acquisition of land on the south-western side of the Parade for the purpose of erecting the City Hall, completed in 1905, thus adding to the public and government buildings clustering around the southern and eastern edges of the CBD. Gradual encroachment by the Commercial Exchange, the railway station, Standard Bank and Post Office reduced the Parade to its present size (compare Figure 2.2 and 3.1).

At the same time, the expansion of the higher density inner residential zone was completed by the subdivision of the remaining private gardens and homesteads up the lower slopes of the encircling mountains. Within this zone, to the north-west of the CBD in the Malay Quarter and south-east in District Six, the quality of the built environment, comprising low income housing interspersed with warehouses and light industry close to the CBD, deteriorated steadily.

In 1884 the Parliament building to serve the government of the Cape Colony was completed (Honikmann, op cit, p35). In 1910, after Union, Cape Town became the legislative capital of South Africa and this building became the Parliament of the Union of

South Africa. This inevitably attracted the development of government offices around it, adding to the cluster of public and government buildings at the end of the gardens nearest the CBD. The gardens themselves were ceded to the municipality as the Cape Town Public Gardens in 1892.

With its port and administrative activities developing strongly and its industries stimulated during the First World War, Cape Town continued its rapid growth in the early decades of the twentieth century. The physical coalescence of the City of Cape Town and the municipalities of Green and Sea Point, Woodstock, Maitland, Mowbray, Rondebosch, Claremont and Kalk Bay was recognised by their unification in 1913 (Province of the Cape of Good Hope, Ordinance 19 of 1913), with the addition of Wynberg in 1927 (Province of the Cape of Good Hope, Ordinance 14 of 1927).

The census of 1921 revealed the population of the Cape Town urban area to be 220,502 persons (South Africa (1960), p A12). The average annual population growth rate was three per cent per annum between 1921 and 1936. By 1938 traffic congestion was becoming evident in the CBD due to population growth, the popularisation of the private car, the change to a traffic axis running from east to west and the inappropriateness of the 18th century street plan with its narrow cross streets (30 foot (9.15 metre) carriageways). This was exacerbated by the fact that the old Strand Street artery had been truncated by the railway station, leaving Darling Street and Roeland Street as the main

thoroughfares for traffic entering from the east.

BARRIERS TO EXPANSION AND THE FORESHORE - 1939 TO 1957

By 1939 the limits of natural lateral expansion of the CBD had been reached. To the north-west the slopes of Signal Hill imposed a barrier to pedestrian movement. To the north-east Table Bay rendered expansion impossible. On the south-west and south-east sides man-made barriers in the form of the cluster of municipal, provincial and national government buildings including the City Hall, the Houses of Parliament, the Parade, the Public Gardens, and the railway station and yards enclosed the CBD. The cluster of public land uses formed an almost continuous barrier, broken only by the retail and business artery of Plein Street.

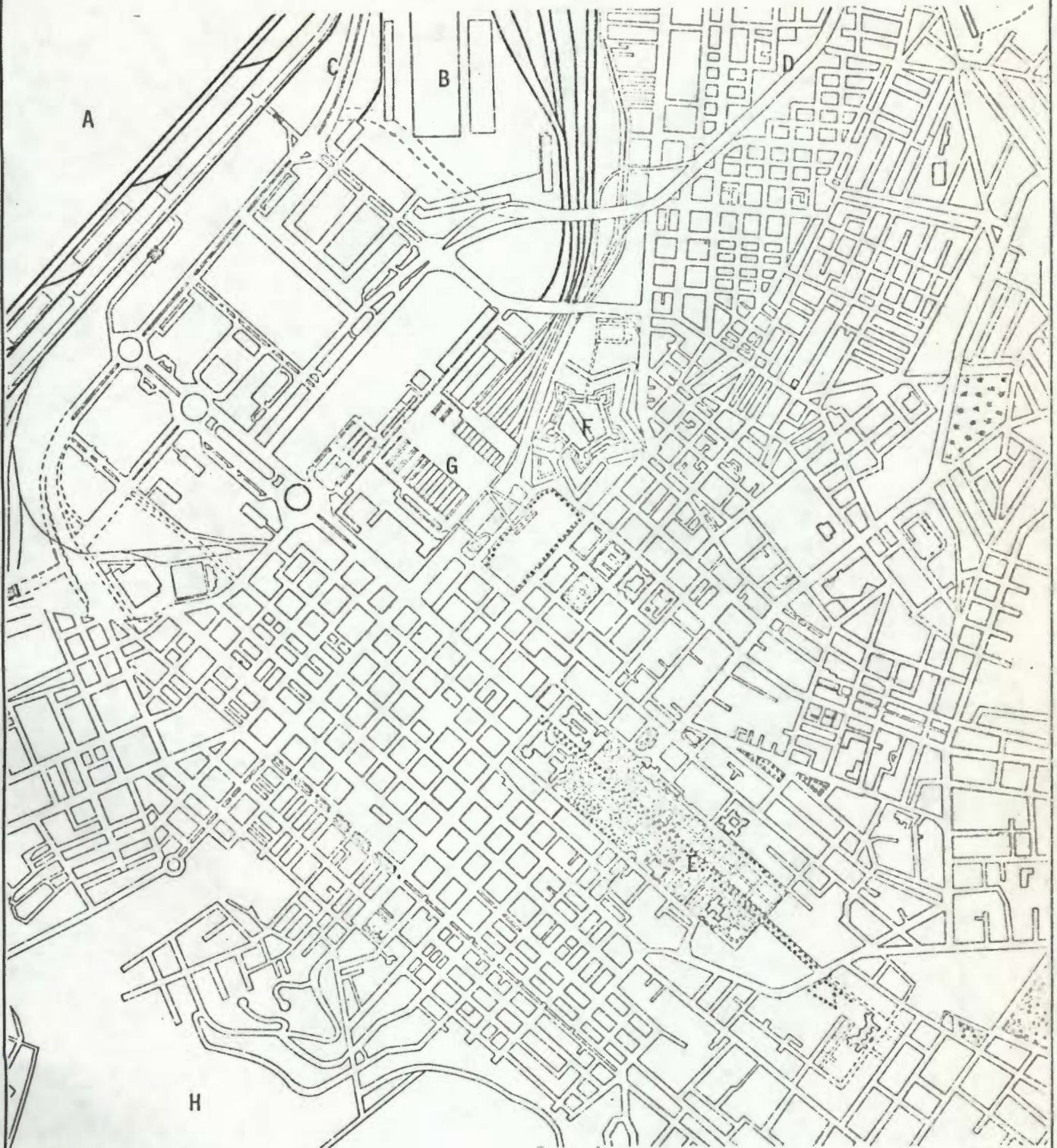
Although it was evident that the constricted CBD would be unable to efficiently accomodate the vigorous expansion of central city activities forecast for the post-war years, it was not practicable to remove these critical man-made barriers. The Public Gardens and the Parade were historical monuments effectively insulated from change. The railway station and yards were located on the flattest land facing the Devil's Peak gap through which the main line was forced to pass. Finally, the cost of removing the cluster of administrative buildings would have been prohibitive, even if alternative sites had been available.

Thus increasing congestion and space limitations were issues that faced the further development of the CBD in 1939. These issues

can only have been minor in comparison to the problems experienced in many major western cities of the time, but they nevertheless assumed local importance¹. Among the responses to these problems was the emergence of office establishments in decentralised locations, including the head offices of certain large insurance firms. Problems of congestion would certainly have become severe in the post-war period, were it not for the unique circumstances that led to the addition of an extensive tract of reclaimed land created as part of the scheme to develop new harbour facilities in the Duncan Dock.

In 1938 the South African Railways and Harbours Administration initiated work on the Duncan Dock to accomodate the growing volume and size of shipping handled in Table Bay. This dock was sited some distance seaward of the 1938 shoreline, and the excavations afforded the opportunity for the reclamation of some 194 hectares (480 acres) of land. Most of the reclaimed land was used for harbour facilities, the Culembourg railway goods yard, and the new railway passenger station, but some 65 hectares (160 acres) was made available to the City Council for the expansion of the central city (see Figure 2.3). Although a joint committee of the City Council and the Railways Administration was established in 1942 to plan the Foreshore (as this area was termed), discussions foundered on a fundamental disagreement concerning the siting of the new railway station. In 1945 the Szlumper Committee, appointed by the government, pronounced in

¹ Even as late as 1947 there were only 37,000 vehicles registered in the City of Cape Town (Cape Times, May 24th, 1984).



- A Duncan Dock
- B Culemburg Railway Goods Yard
- C Table Bay Freeway
- D Eastern Boulevard
- E Cape Town Gardens
- F The Castle
- G The Railway Station
- H Signal Hill

favour of the Railways Administration's view that the station should front onto Adderley street. Subsequently, the Cape Town Foreshore Joint Technical Committee was established, which published its final plan for the area in 1947 (Cape Town Foreshore Joint Technical Committee, 1947).

By 1957, the date of Davies' CBD study, the infra-structure of the Foreshore had largely been developed (see Figure 2.3), but the first buildings had yet to be occupied. At that time the C.B.D., as defined by Davies (1965, Figure 4), contained 1,120,420 square metres (12,060,120 square feet) (Davies, 1965, pl01) of gross construction area (this figure also includes vacant lots, but not those on the Foreshore). Taking the 1960 census population of the Cape Town urban area as 807,211 persons (South Africa, 1971, pl5A) there were 1.388 square metres (14.94 square feet) of C.B.D. floor space per inhabitant.

THE MODERN CITY - 1958 TO THE PRESENT

Building development on the Foreshore began in 1957, and proceeded rapidly through the 1960's. The success of the Foreshore in diverting new growth from the old city during this period may be gauged from the fact that there were approximately 1,151,078 square metres (12,390,088 square feet) of gross floor area within Davies' C.B.D. boundary, which excluded the Foreshore, in 1970. During the period 1957 to 1970, therefore, floor space in the old city grew at a rate of 0.2 per cent per annum compound as opposed to an overall growth rate of 2.9

per cent when the foreshore and other additional areas included in the 1983 C.B.D. study boundary are added.

X In addition to developments on the Foreshore, 1958 saw the start of work on the City's freeway system (Morris, 1960). The dual carriageway of De Waal Drive was completed in 1959, the Eastern Boulevard in 1968 and Table Bay Boulevard in 1959 (Cape Town City Council, enquiry). A bypass around the northern edge of the central city for traffic travelling between the Atlantic Suburbs and the Northern and Southern Suburbs was effectively completed in 1977 (although there is still a missing segment). The 1958 plan, however, remains incomplete. A western link planned for the inner city ring road has not been constructed due to high costs, environmental objections, and changed attitudes to the use of the private car on the part of urban authorities. It is not likely that this ring road will be constructed in the foreseeable future. Notwithstanding these factors, the construction of the freeway network, accompanied by a major increase in per capita car ownership¹, has facilitated a rapid growth in the use of private transport for the journey to work in the C.B.D., with the result that heavy congestion now occurs on the road system at peak hours.

During the 1970's the rate of building development on the Fore-shore slowed; only eight buildings were completed in the period since 1970. The focus of new construction has shifted back to the

¹ A total of 317,000 vehicles were registered in the City of Cape Town in June 1984 (Province of the Cape of Good Hope, enquiry).

old city, but more specifically to the area lying between the old hard core and the new foreshore area. Altogether, nine buildings have been completed between Castle Street and the 1938 shoreline since 1970, with three more currently under construction. The growth rate for Davies' C.B.D. was 1.8 per cent per annum compound between 1970 and 1983, while that for the 1983 C.B.D. study area was 2.7 per cent per annum compounded. By 1983 the C.B.D. contained 2,289,241 square metres (24,641,161 square feet) of gross floor area (excluding vacant lots) to give 1.569 square metres (16.89 square feet) per inhabitant, using the 1980 census population for the Cape Town urban area of 1,458,620 persons (South Africa, 1982, pl.7). This represents an increase of 0.181 square metres (1.95 square feet) per inhabitant in the period and indicates that the C.B.D. grew relatively more rapidly in terms of floor area than did the population of the city.

Notwithstanding indications of significant growth of the C.B.D., a feature of this period has been concern over the relative decline of the C.B.D., something which has been particularly apparent in the retail area where suburban shopping centres have proliferated in almost every suburb. Over the period 1957 to 1983 the compound growth rate of the retail sector in the CBD was 1.1 per cent per annum, which is considerably less than the growth rate of 2.8 per cent per annum for all land uses. Even in the office sector the development of suburban office buildings, apparent in isolated cases in pre-war years, has continued. As part of an attempt to make the central city more attractive the

City Council developed the Strand Street Underground Concourse which was completed in 1976. This development has now been expanded into an extensive underground shopping mall system through the completion of the Old Mutual Centre, the Golden Acre, and the Southern Sun Gallery. Seven city blocks are now linked in an underground mall, while undercover access to the railway and bus stations is also provided. The effect has been to move the retail centre of the city to the intersection of Adderley and Strand Streets with a concentration of the pedestrian flow in the underground passages. Cape Town City Council surveys indicate that the flow through the Strand Concourse alone reaches 4,800 persons per hour at peak periods. Pedestrianisation has been used in conjunction with the underground mall scheme to improve the attractiveness of the central city for shoppers. At this stage Waterkant Street between Adderley and St. Georges Street and Castle Street between Burg Street and Parliament Street have been pedestrianised, leaving much of the 'City for the People' scheme (Morris, 1975) unimplemented.

Two further factors are of significance to the history of the central city. Firstly, recent years have seen growing concern for the preservation of Cape Town's historical heritage. While it has already been shown that the Foreshore initially diverted considerable growth away from the old city, and thus indirectly preserved many historic buildings, pressure for the redevelopment of the old city has intensified since the late 1960's with the loss of many architecturally significant buildings. Developers have responded to public pressure for urban conservation either

through renovating existing buildings (notable examples have been the Nedbank building, the Standard Bank in Adderley Street and the Inn on the Square), or through rebuilding behind a preserved facade (as in the case of the Glaser development on the block bordering on Loop, Church, Bree and Wale Streets. The new Provincial Administration building has also preserved the facades facing onto Long Street). The City Council has also been active in this regard and is proposing to proclaim 'Historic Zones' in which planning permission for alterations could be refused in the case of historic buildings.

Secondly Cape Town has, over a long period, lost its former national economic dominance to the Pretoria - Witwatersrand - Vereeniging urban complex. Although Johannesburg did not exist prior to 1886, by 1921 the Witwatersrand region (focused on Johannesburg) had far overtaken Cape Town. In that year the Witwatersrand had a population of 537,307 persons against 220,502 persons in Cape Town making it about 2.4 times larger (South Africa, 1960, pA12). By 1980 the Witwatersrand had reached a population of 4,063,880 persons, some 2.8 times larger than Cape Town's population of 1,458,620 persons (South Africa, 1982, pl.7). A larger market, the presence of gold mining, and the concentration of industries in the Witwatersrand area have combined to cause the loss of many of Cape Town's head offices to Johannesburg. Whereas in 1950 14 per cent of the companies listed in the Johannesburg Stock Exchange Handbook had their registered office in Cape Town and 64 per cent in Johannesburg, this had

altered to 11 per cent in Cape Town and 71 per cent in Johannesburg by 1984. In fact Cape Town has reached the stage where it only retains the headquarters of the oil companies, several retail chains, various fishing, food and shipping companies, and a significantly reduced portion of the financial sector.

This chapter has served to define the historical context in which the current form of the C.B.D. is set. Subsequent chapters will examine the present pattern of office location in an attempt to develop a model of office location in the central city. Chapter 7 returns to a consideration of the likely future impact of the trends identified in this chapter on office development and its pattern of location in the C.B.D. of Cape Town to the year 2000.

CHAPTER 3

DELIMITING THE CENTRAL BUSINESS DISTRICT STUDY AREA

A primary focus of the present study is to examine the locational pattern of office land uses within the CBD. To undertake the study it is clearly necessary that the CBD be spatially defined. Bearing the contained objectives of the study in mind it is necessary to consider the degree to which it is requisite to attain precision in the definition of the CBD.

The most widely adopted CBD delimitation technique is the Central Business Index procedure proposed by Murphy and Vance in 1954. The procedures have been further developed and applied by, amongst others, Davies (1965), Davies and Rajah (1965), Beavon (1969), and Dewar (1970) under South African urban conditions. The technique is based on comprehensive land use surveys of central areas of cities.

The procedure was not adopted for use in the present study. To have done so would have involved a survey which could not be justified by available resources and manpower, would have included material beyond the immediate scope and need of the study and one which would not necessarily contribute to the refinement of the analyses undertaken in the study, or of the conclusions drawn from such analyses. Furthermore, the probability of office land use in central Cape Town occupying space more narrowly defined than the boundary of the CBD is high. The problem of defining a CBD nevertheless remained.

DEFINITION OF THE 1983 CBD

Although Davies' (1965) 1957 CBD boundary is now outdated and may no longer be accepted as valid, it provides an initial core of space that may be included within a contemporary CBD. Reconnaissance field survey confirmed the validity of that assumption. An extended reconnaissance survey of city blocks peripheral to the Davies CBD boundary provided evidence sufficient to estimate the probable location of the contemporary CBD boundary.

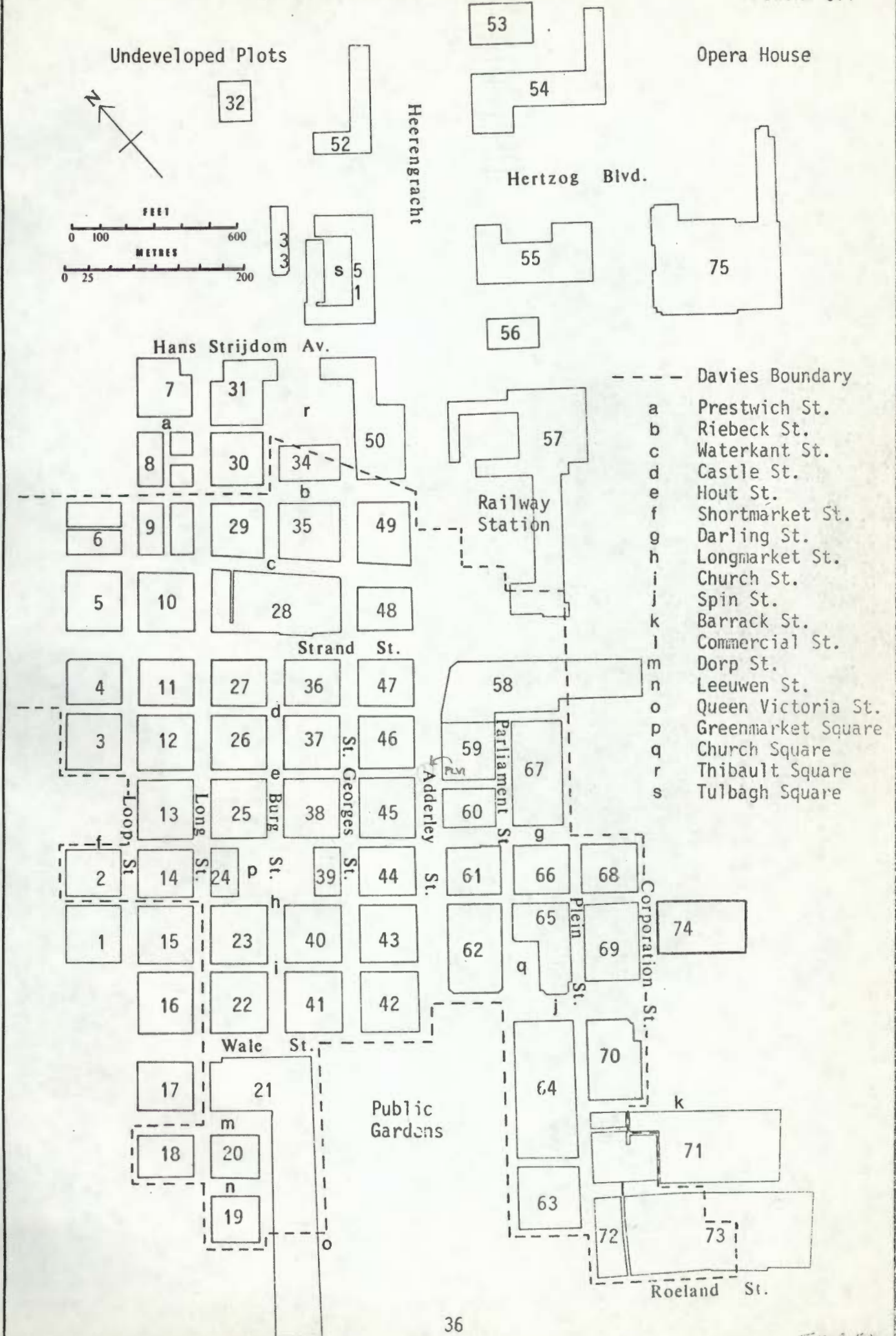
The land use evidence showed that since 1957 the CBD has, with one notable exception, been subject to limited lateral expansion. Since that date large scale development of the CBD has taken place northward onto the Foreshore.¹ In that area the CBD is clearly delimited by a surrounding zone of still undeveloped land, the Opera House, Civic Centre and the Railway Station.

Lateral growth of the remaining areas of the CBD was constrained in several directions by absolute barriers to expansion (discussed in Chapter 2). On the eastern margin barriers comprise the Grand Parade and a concentration of government land uses east of Corporation Street (Figure 3.1). To the south the boundary is marked by the barrier of Stal Plein, Parliament, The Gardens and

¹ The Foreshore comprises the area north of and including city blocks numbers 7, 31, 50 and 57 that fell within the jurisdiction of the Cape Town Foreshore Joint Technical Committee (1947).

Identification of CBD Blocks

FIGURE 3.1



the Anglican Cathedral. Only on the western and south-eastern margins (blocks 71 and 73 in Figure 3.1) is it the case that a gradual transition from CBD to the surrounding Frame occurs. City blocks in these areas were subject to particular scrutiny, a procedure which permitted Davies' 1957 boundary to be modified. Space added to the CBD included city blocks that contained a significant concentration of office Gross Construction Area.

The most significant modifications made to the 1957 boundary include:

- 1) The Foreshore (i.e. the area north of and including blocks 7, 31, 50 and 57) has been developed since 1957 when Davies conducted his survey. As it now contains a considerable portion of the city's CBD activities and many of the largest and most modern office buildings, this area was added to the CBD. It should be noted that five blocks east of Jan Smuts Avenue, which formed part of the area covered by the 1947 Foreshore Plan, are excluded from the CBD. These blocks are separated from the CBD by the barrier of the Opera House and Civic Centre, are presently only partially developed, are zoned for light industrial and warehousing uses (B6 & C5) in terms of the Revised Final Statement of the Proposed Town Planning Scheme (1982), and are between 800 metres (1/2 mile) and 1,100 metres (0.7 miles) linear distance from the Peak Land Value intersection, which was located at the intersection of Adderley and Hout Street in 1983.
- 2) The Mayor's Garden site east of Corporation Street is shown

as included although this has no practical significance for the present study. The block is currently being developed as the national headquarters of a retail chain and will form an integral part of the CBD from 1985. The block has been included in the present study to allow comparison of the results of the present study with future resurveys of the CBD.

- 3) Block number 71 on Plein Street has been extended eastwards to include a 21,000 square metre building constructed since Davies' study. Block number 73 has also been extended through to Buitenkant Street for the same reason.
- 4) Block number 21 has been extended southwards to include the 17,000 square metre of GCA contained in Huguenot Chambers.
- 5) Block numbers 1, 15, 16 and 17 have been included within the CBD. These city blocks contain 21,000 square metres, 4,000 square metres, 19,000 square metres and 15,000 square metres of office GCA respectively. Though marginal in office GCA content, block 15 is surrounded by blocks that are now included in the CBD, and may itself be included by applying the Murphy and Vance (1954) special rule 2. Two neighbouring blocks fronting on Loop Street and adjacent to blocks 16 and 17 were vacant sites at the time of the survey. Projects presently being undertaken for these blocks will in the future require their inclusion within the CBD.

- 6) Remaining city blocks peripheral to the western 1957 boundary of the CBD remain excluded on grounds of land use composition. Four of Davies' blocks west of Bree Street may in future be partly deleted from the CBD if the proposed Buitengracht Street limb of the inner ring road is built. The most western of those blocks has already been absorbed by the Buitengracht interim road scheme. These blocks have been excluded from consideration in this study.

The CBD mapped in figures presented in the thesis provides for the boundary modifications. Limitations of page size, however, has meant that marginal CBD blocks west of Bree Street have not been plotted. Because the boundary has been determined by reconnaissance methods a definitive bounding line has not been drawn about blocks included within the CBD for this study.

The CBD defined for the present study comprises the 75 numbered city blocks shown in Figure 3.1, occupying a total site area of 55.66 hectares (137.4 acres).

To facilitate the analysis, description and interpretation of land use patterns (Chapters 5 and 6) the CBD has been divided into sub-areas (Figure 3.1):

- 1) FORESHORE: The Foreshore comprises all city blocks north of a line linking the southern frontages of blocks 7, 31, 50 and 57. These city blocks occupy land that was reclaimed or cleared of existing development in the creation of the Cape

Town Foreshore and the Duncan Dock in the 1940's (Cape Town Foreshore Joint Technical Committee, 1947).

- 2) RETAIL CORE: The retail core comprises city blocks 45¹ through 49, 58, 59, 66, 68 and 69.
- 3) REDEVELOPMENT ZONE: The redevelopment zone comprises city blocks located between Hans Strijdom Avenue and Castle Street, the majority of which have been subject to² redevelopment in the period since 1958.
- 4) PERIPHERY: City blocks that fall beyond the Retail Core and the Redevelopment Zone in the old city comprise it's periphery.

1 These blocks comprise the first octile city blocks, and the first and second ranked second octile city blocks in terms of retail bulk index values, as shown in Figure 7.3.

2 The significance and development pattern of the Redevelopment Zone in the growth dynamics of the CBD is a subject of particular discussion in Chapter 7.

CHAPTER 4

METHODOLOGY - CLUSTER DELIMITATION AND THE QUESTIONNAIRE

The primary aim of this study is to examine the structure and nature of the office land use system within the Cape Town CBD. It will seek to determine whether or not there are significant variations in the location patterns of different office land uses, examine the spatial relations of such patterns and thereafter to identify possible factors that may underlie land use distributions. The chapter deals firstly with the definition of office land uses, the process of collecting office floor space data and the application of analytical techniques. Secondly it reviews a questionnaire survey conducted to determine processes operative within the land use system and which are important in developing an explanation of land use patterns.

DEFINITION OF LAND USES

The point of departure in classifying the land uses to be examined in this study was the land use classification put forward by Murphy and Vance (1954) and applied by Davies in his study of the Cape Town Central Business District (1965, p 90). The main office land use categories identified in the classification have been adopted for the present study. They comprise Financial Offices, Service Offices, General Offices, Transportation Offices, Organizational Offices, Government Offices and Vacancy. The major categories were further subdivided into a total of 40 office land uses as indicated in Table 4.1. In addition data were

TABLE 4.1

OFFICE LAND USE CLASSIFICATION

FINANCIAL OFFICES	1A	Insurance companies.
	1B	Banks.
	1C	Stockbrokers, trust companies, credit card companies, medical aid funds, pension funds financial advisers & other financial institutions.
	1D	Building societies.
	1E	Insurance brokers & assessors.
	1F	Estate agents, property developers & administrators.
SERVICE OFFICES	2A	Lawyers (NOT courts).
	2B	Newspapers & publishers.
	2C	Engineers & surveyors.
	2D	Personal Services - hairdressers, beauty clinics, health clubs, manufacturing jewellers located in office space.
	2E	Medical practitioners & clinics.
	2F	Accountants.
	2G	Business services - copying, personnel agencies, security agencies, office equipment suppliers, travel agents.
	2H	Import/export agencies, manufacturers agents, wholesalers.
	2I	Computer services.
	2K	Advertising & public relations agencies.
	2L	Architects & planners.
	2M	Film & entertainment - photographers, film companies, modelling agencies, audio-visual companies.
	2N	Medical suppliers.
	2O	Clothing - tailors, dressmakers and so forth located in office space.
GENERAL OFFICES	3A	Oil & petrochemical.
	3B	Retail activities in office space - either offices of large chain stores or shops not on the ground floor where access was through the entrance to the office section of the building.
	3C	Industrial & manufacturing companies, including holding companies and state corporations.
	3D	Fishing, agricultural and food processing companies.
	3E	Construction companies.
	3F	Mining companies.

TRANSPORT OFFICES	4A	Shipping lines & ships agents.
	4B	Freight forwarders & clearing agents.
	4C	S.A. Transport Services, bus companies, taxi companies & car hire firms.
	4D	Airlines.
ORGANIZATIONAL OFFICES	5A	Professional bodies - trade unions, industrial councils, societies, institutes.
	5B	Educational institutions.
	5C	Religious groups (NOT places of worship).
	5D	Charities.
GOVERNMENT OFFICES	6A	National government.
	6B	Municipal, divisional and provincial government.
	6C	Diplomatic missions.
VACANCY	7A	Vacant offices, including offices being renovated.
NON-OFFICE LAND USES		Vacant sites. Construction sites. Covered parking. Shops. Factories & workshops. Museums. Places of worship. Garages & car showrooms. Hotels. Residential uses. Other land uses. Building caretakers flats, cleaners stores.

The land uses given are representative of those included in each land use category, but do not necessarily comprise a complete list.

Office land uses are organised in decreasing order of Gross Construction Area occupied within each office sector.

collected for the following non-office land uses: Retailing , Parking, Factories & Workshops, Museums, Churches, Hotels, Residential, and Service Stations. These categories constitute a condensation of the Murphy and Vance classification and will be used to illustrate changes in functional composition of the C.B.D. over time. A full analysis of these land uses, however, is not a primary objective of the study.

CBD FLOOR SPACE DATA

The only readily accessible source of floor area data for the central city was the Valuations Roll maintained by the Cape Town City Council. The Valuations Roll is compiled by the Cape Provincial Administration on behalf of the City Council in terms of Ordinance 26 of 1944. The Roll is used to determine the rateable value of properties in the municipal area, for which purpose the precise area of the site and the floor area of any buildings needs to be known.

The listings contained in the Roll provide information on the area of the sites, and the gross floor area of any buildings on such sites. The floor area figure for each building is subdivided into the areas occupied by a potential 999 different land uses. The tabulation gives the impression that the data is highly detailed, but this is misleading. The large majority of the 999 land use codes are, of course, not used since the uses they

represent do not occur in the CBD (for example, such uses as abattoirs and sitting rooms). Precision in the data was also lost through the omission of the areas occupied by uses such as lifts.

As an illustration, the following is an example taken from the listing, the case in point being the Woolworths building on the corner of Strand and Adderley Streets.

REFERENCE NUMBER	CODE	AREA	
WA 021A028	000	0	(1)
	000	2973	(2)
	366	0	(3)
	095	2965	(4)
	100	2916	(5)
	101	5886	(6)
	103	2944	(7)
	104	526	(8)
	105	187	(9)
	226	502	(10)
	312	0	(11)
	313	0	(12)
	310	0	(13)
	311	0	(14)
	315	0	(15)

WA021A028 is the buildings property reference number, and allows the building to be identified on the City Council's maps of the city. Items (1) through (15) have the following meanings:

- (1) no significance,
- (2) the site has an area of 2,973 m²,
- (3) the code for shops (no area specified),
- (4) the area of the basement is 2,965 m²,
- (5) the area of the ground floor is 2,916 m²,
- (6) the combined area of the first and second floors,
- (7) to (9) the area of the 3rd, 4th and 5th floors,

- 2
- (10) the area of a canopy as 502 m², and
- (11) to (15) the building contains a passenger lift, goods lift, air-conditioner, sprinklers and an escalator.

The floor areas contained in the Roll and illustrated above, approximate to the Gross Construction Area. Gross Construction Area is defined as being the total floor area contained within the external walls of a building by the American National Standard Z65.1-1980. In order to achieve a closer approximation to Gross Construction Area, construction features such as verandahs, canopies, patios, covered terraces, driveways and yards were deleted from the total area derived from the Roll. In the case of the Woolworths building, for example, the area of the canopy was excluded. In further refining the data a decision was taken to exclude the Gross Construction Area occupied by unusable floor space, such as that occupied by lift gear, in cases where the land use survey found that an entire floor was so occupied. In the example the area of the 4th and 5th floors was used to house lift gear and access point to the roof and was excluded from the total. The result is that this building was regarded as having a total gross construction area of 14,711 square metres. It was not possible to express the data in terms of the American National Standard Rentable Area, which is defined as the floor area contained within the external walls of the building, but excluding all vertical penetrations of the floor, such as space occupied by stairwells, lifts and ventilation shafts. This issue is of no practical significance for the present study, but it

could represent an inconvenience to readers in the property industry who have adopted Rentable Area measurements as their preferred standard.

Ultimately, a ledger was completed listing the gross construction area of each potentially usable floor of the 449 properties that comprised the Central Business District. The ledger provided the basis on which the land use survey was undertaken.

THE LAND USE SURVEY

A detailed land use survey was carried out by the author between late April and early September 1983. A list was made of every office organization occurring on each floor listed in the floor area ledger, together with its land use code in terms of Table 4.1 and the estimated proportion of the floor which it occupied. Similar estimated proportions were recorded for non-office land uses listed in Table 4.1, but the individual organizations were not enumerated separately. In many cases only one organization occurred on a particular floor, but where more than one was found the relevant proportions were estimated by examining the number of bays or offices occupied, or they were estimated by pacing. As an example, a doctor's surgery (category 2E) might have been estimated to occupy 1/5th of the 8th floor of the Medipark building, with the remainder taken up by medical suppliers (category 2N). These fractions allowed the estimated Gross Construction Area occupied by each land use to be calculated for

each floor and entered in the ledger. The values for each floor were summed to give the total floor area occupied by each land use in the building.

As a rule of procedure, any premises occupied by an organization classified as an office land use in Table 4.1, was itself enumerated as an office, irrespective of the location of the premises. Some exceptions to the rule were made, however. These related to category 2D (Personal Services) and category 3B (Retail Offices) where only occurrences located in separate office space were recorded under the office headings, with the remainder being classified in the retailing category. Category 3B requires further clarification. It constitutes a special category introduced to accommodate the offices of several large retail chains and occasionally shops located in space that could normally be expected to be occupied by offices on upper floors of buildings otherwise used for offices. If access to a shop or the offices of a shop was gained through the entrance to the office section of a building, then the organization was classified as part of the 3B category.

A total of 2,559 organizations classified as offices were enumerated by the survey, to which should be added 9 cases of buildings containing premises which could not be identified (generally because the nameplate failed to reveal the nature of the business, and no staff were available for enquiry). At this stage it is sufficient to note that the floor space and land use surveys revealed that the CBD contained 2,289,241 square metres

(24,641,185 square feet) of Gross Construction Area devoted to all land uses (but excluding vacant sites and buildings under construction). Of that area 68.7% was occupied by office land uses. Further discussion of these results is undertaken in Chapter 7.

It has been assumed that the data obtained from the Valuations Roll is as accurate as it is possible to achieve. The only possible inaccuracy lies in the estimation of the floor space occupied by individual land uses. Even here no error would be possible in cases where only one land use occurred on a particular floor. Any inaccuracy in estimating the proportions of floors occupied by land uses should cancel out in the aggregate. Davies (1965, p104) estimated that his floor area calculations, determined by a visual estimation from the outside of a building, were in error by not more than 2 per cent, and it is confidently expected that the error in the present study is significantly lower.

LAND USE ANALYSIS TECHNIQUES

Given that this study is concerned with the geography of office location in central Cape Town, analytical techniques were required to identify and describe the locational patterns and clustering that might be present in the data.

A variety of statistical cluster analysis techniques is

available. The majority of these techniques, such as those used by programs P1M to P4M of the BMDP computer package (Dixon, 1981, pp447-478) and the CLUSTAN package (Wishart, 1982), serve to identify clusters in abstract space. These techniques seek to identify clusters of either variables or the individual cases comprising a particular variable in terms of some mathematical measure of the 'distance' between the variables or cases. The cluster is illustrated by means of a dendogram (a tree diagram) which links firstly the 'closest' variables or cases, then adds the next 'nearest' variable or case, and so on. Such techniques do not achieve the purpose required for the present study since they do not produce a boundary that can be illustrated on a land use distribution map.

The cluster analysis technique proposed by Davies (1965) has the principal advantage over other techniques of being intended to delimit land use clusters on a map. The Davies technique was thus selected for use in the present study. The technique is designed to identify distributions grouped around a weighted centre of gravity and which decrease in intensity with increasing distance from the centre. The technique calculates an inclusion factor, 'F', by trading off size (floor area) against the distance of the lot (building) from the weighted centre of gravity. Thus for two lots of identical size, the one closest the centre will have the higher inclusion factor, and hence the stronger case for inclusion within the cluster boundary. A disadvantage of the technique is that other types of distribution, such as a ring or crescent structure, would be poorly delimited.

Previous studies, such as those by Davies (1965), Goddard (1967) and Dewar (1970), have shown that most land uses occurring in the CBD or the adjacent transition zone have distributions of the type that Davies' technique was designed to analyse. This suggests that the inappropriateness of the technique for use on distributions showing clustering patterns other than the centroid type can be assumed to be of minor significance for the present study. The land use distribution patterns were checked visually to ensure that the delimited clusters were an appropriate reflection of the overall land use pattern.

It should be noted that Davies' cluster analysis technique will delimit a cluster in all cases, even when applied to a uniform distribution. This arises from the assumption that the distribution is spatially clustered about the weighted centre of gravity. Thus the technique does not actually prove that the distribution concerned is actually clustered. The possibility that Nearest-Neighbour analysis might assist in describing the degree to which particular office land uses were clustered was considered. The technique compares the actual mean distance between points comprising a distribution to the expected mean distance if the points were randomly distributed (Ebdon, 1977, pp121-127). The technique is intended for use on a point distribution, which, in this case, implies measuring nearest neighbour distances between the central points of individual lcts. The technique is inappropriate in this analysis because

lots vary considerably in size in different parts of the CBD and also because road widths between blocks vary greatly. Thus a land use such as Computer Services which is almost entirely located on the Foreshore (Figure 5.16) was found to be slightly more uniformly distributed than a land use such as Banking (Figure 5.3), according to the indices calculated for each. The discrepancy arises because Foreshore lots are both large and widely separated so that distances between nearest neighbours cannot be other than large. Further, the Nearest-Neighbour technique does not allow for differences in the floor areas contained within the various lots comprising each distribution, so that a land use such as Medical (Figure 5.12) would be classified as having a random distribution, even though 64 per cent of the area is contained in just two buildings. For all these reasons this technique was finally rejected as being unsuitable.

To assist in the interpretation the weighted centre of gravity and inclusion boundaries for the office sector as a whole were also calculated. That evidence permits maps of individual land use distributions to be compared with the average position, facilitating the identification of significant differences. In order to objectively indicate the degree to which the individual land use distributions were clustered about their respective weighted centre of gravity, three indices were developed. The details of the inclusion boundary delimitation procedure and the method of calculating the indices follows in the next section.

DAVIES' CLUSTER DELIMITATION TECHNIQUE

Davies' (1965) cluster analysis technique calculates an inclusion factor, 'F', for each lot in a particular land use distribution according to the procedure detailed in Appendix 1. In order to delimit clusters on a map it is necessary to use a percentage enclosure value to demarcate a dividing or cut-off point in the column of cumulative percentage areas derived by ranking the 'F' values and the corresponding percentage floor areas contained by the lots. All the lots above the cut-off point are considered part of the cluster and the boundary circumscribes these lots on the map. A serious limitation to this procedure is that Davies does not indicate any objective technique for determining appropriate percentage enclosure values. Davies suggested that the "value of 97 per cent enclosure yielded the best average cluster boundary", (Davies, 1965, p42), but the present author agrees with Beavon (1969) that that value is insufficiently discriminant to achieve a satisfactory analysis of the data. The possibility that a clear break of slope might exist in a graph of cumulative percentage areas plotted against their respective rankings is not helpful, since any such break could be expected to be different for each of the 33 land uses delimited. Ultimately it was resolved to use an enclosure value of 50 per cent to depict the core of each distribution. The value corresponds to the one used by both Davies (1965) and Beavon (1969). A value of 80 per cent was chosen to depict the outer cluster boundary, since such a boundary was found, on average, to

include half of the total number of lots comprising each distribution. It was found that on average these boundaries included 20 per cent and 50 per cent respectively of the lots comprising each distribution.

The actual percentage of the floor area enclosed by the 50 per cent and 80 per cent boundaries is slightly different to these values, due to the fact that these cutoff points usually fell between two cumulative percentage values. In all cases the entry in the table nearest to either 50 per cent or 80 per cent was taken as being the limiting value. In cases where this was more than four per cent from either 50 per cent or 80 per cent, then the exact percentage floor area enclosed by the boundary is indicated, as in Figure 5.12. The cluster boundaries delimited in Figures 5.1 through 5.34 were drawn as 'tightly' as possible around included lots, while still maintaining a smooth shape. In certain cases satellite clusters are depicted where a group of included lots were separated from the main cluster by either an excluded lot or by a minimum intervening distance of one and a half street blocks. Some clusters contain inliers of lots that failed to achieve a high enough F value to qualify for inclusion, but which were surrounded by included lots. In such cases the exclusion of inliers would have caused an unacceptable distortion of the delimited pattern. Therefore such lots were included within clusters. The inclusion of inliers had an insignificant effect on the actual percentage floor area enclosed by the cluster boundary, due to their small size.

Three indices of clustering, termed Index 'I', Index 'J' and Index 'K', were calculated according to the following formulae:

$$I = \frac{\text{Average Distance of 50\% Core Lots From WCG}}{\text{Average Distance of All Lots From WCG}}$$

where the weighted centre of gravity (WCG) is that for the particular land use concerned,

$$J = \frac{\text{Average Distance of 50\% Core Lots From Land Use WCG}}{\text{Average Distance All Office Lots From All Offices WCG}}$$

and

$$K = \frac{\text{Average Distance All Land Use Lots From Land Use WCG}}{\text{Average Distance All Office Lots From All Offices WCG.}}$$

Index I indicates the degree to which the core of a land use distribution is clustered about the WCG with respect to the whole of the particular land use distribution. The lower the index the more tightly the core is clustered. Index J indicates the degree to which the core of a particular land use distribution is clustered about the WCG for that land use with respect to the distribution of the whole office sector. If the core shows the same degree of clustering as does the core of the whole office sector, then the index will assume a value of 0.82. Index K indicates the degree to which the whole of a land use distribution is more clustered about it's WCG than are all offices. A value of one indicates that the lots comprising the particular land use distribution are on average the same distance from their WCG as are all offices from the centre of gravity of the entire office sector.

THE QUESTIONNAIRE SURVEY OF OFFICE LAND USES

A questionnaire survey was undertaken as part of the study to provide information on factors which were thought to be significant in determining office location preferences. Information on indicators of short term office development trends and other characteristics of the contemporary office function, such as the number of employees of each establishment, was also required.

The format of the questionnaire was strongly influenced by the structure of a questionnaire used by Croft (1969, ppl06-114) in a study of office establishments in Leeds. Crofts study focussed on communications, with a view to identifying land uses which offered potential for decentralisation. In the present study the specific objectives of the questionnaire were to:

- 1) provide data on five factors which were hypothesised to be the most likely factors influencing the locational choice of an establishment. These were the need to be accessible to clients, the need of the staff to be near such facilities as shops and other services, the need to be close to organizations with which there was a strong linkage, the desire to occupy prestigious and well appointed premises and lastly the importance of the asking rental.
- 2) identify major linkages for each land use. Most previous studies have suggested that linkages are an important, if not the major, locational influence. The questionnaire was

also intended to indicate the relative strengths of linkages and thereby indicate to what extent these might be expected to influence the land use pattern.

- 3) provide information on characteristics such as size, rent, employment, possession of reserved parking, particular problems and special needs.
- 4) provide information on factors of significance in projecting the likely course of development of the CBD over the next five years. Such factors as decentralisation, employment growth and additional floor space requirements were among those considered.

Individual questions were appropriately adapted to local circumstances, and additional questions were included to meet specific requirements of the present study. Questions added to those used by Croft were numbers 1, 13, 14, 21 to 27, 29, 31, and 33 to 36. The full questionnaire is contained in Appendix 2.

The questionnaires were distributed by post in order to provide as wide a coverage as possible. This method had the advantage of obtaining data from a larger number of establishments than would have been possible if the study had been conducted on an interview basis. Cost constraints served to limit the depth of coverage of the 2,559 office establishments located in the CBD. Available funds provided for the administration of about 1,400 questionnaires. To ensure an adequate sample coverage fifty establishments were selected in each land use category to receive a questionnaire, except in those categories with a population of less than fifty establishments. For such categories

TABLE 4.2

QUESTIONNAIRE STRATIFICATION AND RESPONSE RATES

CATEGORY	NO. OF FIRMS	NO. QUESTIONNAIRES SENT	RESPONSE	%
1A	68	50	20	40%
1B	65	49	15	31%
1C	114	50	24*	48%
1D	24	24	5	21%
1E	81	51	17	33%
1F	107	50	20	40%
2A	121	50	17	34%
2B	38	38	12	32%
2C	97	51	24	47%
2D	200	51	10	20%
2E	232	52	17	34%
2F	88	50	11	22%
2G	165	52	21	40%
2H	207	49	15	31%
2I	56	49	20	41%
2K	41	41	18	44%
2L	69	50	22	44%
2M	72	50	10	20%
2N	45	45	13	29%
2O	64	50	3	6%
3A	13	13	5	39%
3B	65	55	18	33%
3C	125	55	14	25%
3D	31	31	7	23%
3E	18	18	6	33%
3F	8	8	2	25%
4A	27	27	13	48%
4B	35	35	14	40%
4C	11	11	0	0%
4D	16	16	10	63%
5A	83	49	20	41%
5B	25	25	5	20%
5C	19	19	10	53%
5D	27	27	13	48%
6A	65	50	15	30%
6B	6	6	2	33%
6C	31	31	9	29%

* One firm occupying two premises returned a joint questionnaire.

Firms originally classified as 2J were mainly reclassified under categories 2B, 3C and 3B.

questionnaires were administered to all establishments in the category. Office establishments were selected using standard random number tables. An alternative approach using a constant proportional sample of establishments in each land use category was rejected. That procedure would have resulted in certain categories (such as 4D and 6B) receiving a very small number of questionnaires resulting in statistical problems in drawing inferences from small samples.

Table 4.2 details the number of organizations in each category, the number of questionnaires posted, the number completed and returned and the percentage response rate. In total 1,428 questionnaires were posted in the period October to November 1983. It was found that category 2J (Factory Showrooms) contained almost no true examples. Consequently the ten establishments involved were reclassified under other headings. Table 4.2 reflects the position after category 2J was deleted. Further, it was found that a small number of firms had been incorrectly classified according to their stated business in question two of their completed questionnaires. These firms were reclassified in the correct category which explains why in a case such as category 1B only 49 questionnaires are listed as having been sent out, one having been reallocated elsewhere.

A total of 477 completed questionnaires were returned representing a 33.5 per cent response rate. An additional 75 questionnaires were returned, but in an incomplete state. The

sample of completed questionnaires thus represents 18.6 per cent of the total population. The response is satisfactory in the context of a postal survey, and the sample size satisfies statistical requirements. The proportion of questionnaires returned for individual land use categories lay in the 20 to 50 per cent range. Only in the case of categories 20 (Clothing) and 4C (Road & Rail) was the response rate unsatisfactory.

An analysis of question one of the questionnaire indicates that 87 per cent of those completing the questionnaires classified themselves as either Directors or Managers. These officers constitute the executive component of business firms and may be expected to have a close knowledge of their respective businesses, therefore responses may be treated as being generally accurate. The extent to which the sample is representative of the office sector as a whole may be gauged from a comparison of certain of the results with those derived from other sources. In particular, the survey resulted in total employment in the office sector being estimated at 77,237 plus an unknown number of employees associated with land use 4C (Road and Rail, employees probably number at least 1,000). Offices occupy approximately 77 per cent of the floor space available in the CBD (Total space less vacant sites, construction sites and parking garages) which would indicate that total CBD employment in all sectors was about 102,000, on the basis that offices represent the same proportion of CBD employment as they occupy of its floor space. This estimate compares favourably with the City Engineers estimates of 116,050 people employed in the 'central area' in

1975 rising to 137,487 by 1985 (City Engineer, 1980, vol 4, pp11-12), it being noted that the 'central area' defined by the City Engineer comprised the CBD and it's associated Transition Zone, and was thus considerably larger than the present study area.

Land use patterns analysed using Davies' technique are examined in Chapter 5 following. The patterns are further examined to determine whether or not land use distributions exhibit common locational patterns. In Chapter 6 data derived from the questionnaire survey are used in interpreting and explaining both land use patterns and common locational patterns described in Chapter 5.

CHAPTER 5

OFFICE FLOOR SPACE PATTERNS

The objective of the discussion in this chapter is to provide a description of distribution patterns of office land uses as the first stage in gaining an understanding of the locational influences operative within the office sector. The interpretation and explanation of the patterns is undertaken in the chapter following.

THE LAND USE MAPS

Land use cluster maps were prepared, using the method described in Chapter 4 for all office land uses defined in Table 4.1. The land use cluster maps illustrated in Figures 5.2 to 5.34 cover all office land uses except categories 3F (Mining), 3E (Construction), 4C (Rail, Road and Bus Transport) and 5C (Religious). These categories contained a small number of establishments (8, 18, 11 and 19 respectively) and occupied small floor areas. The areas occupied were 4,272, 5,650 and 6,951 square metres (45,984, 60,817 and 74,820 square feet) for categories 3F, 3E and 5C respectively. In the case of category 4C (Rail, Road and Bus Transport) the exact floor area of the Transport Services administration building was not available, but it is estimated that at least 75 per cent of the floor area of the category was to be found in that building. Categories 6A and 6B, namely National and Local Government, are illustrated on one map since there were only six lots containing local government

offices, and all but the Civic Centre were located adjacent to national government offices along Queen Victoria Street and Wale Street.

A total of thirty four land use distributions are shown in Figures 5.1 through 5.34. The land uses are grouped into the seven office sectors identified in Table 4.1. Within each office sector the land use maps and accompanying discussion are arranged so that the land use occupying the largest floor area is placed first, and the smallest last. The actual floor areas occupied by each land use are given in Table 5.2. Figure 5.1 shows the 50 per cent and 80 per cent inclusion boundaries and the weighted centre of gravity for all office land uses. This map is included to allow comparison with the individual land use distributions. The remaining maps show the location of every lot (building) in which a particular land use occurred.

The description of land use patterns is achieved by means of a combination of visual examination and use of three indices of clustering defined in Chapter 4. These were the 'I' index which indicates the degree to which the 50 per cent core of a distribution is clustered about the weighted centre of gravity with respect to the whole of the particular land use distribution. The 'J' index which indicates the degree to which the core of a land use distribution is clustered about the centre of gravity with respect to all offices. Finally, the 'K' index indicates the extent to which a particular land use is more

clustered about its centre of gravity than is the office sector as a whole. Table 5.1 gives the value of the indices for each land use. Reference should be made to the table during the course of the discussion.

Financial Offices:

Insurance Companies: The WCG (Figure 5.2) lies about one and a half blocks to the south-west of that for all offices. The inclusion boundaries indicate that this land use is largely absent from the Foreshore and largely absent from the periphery of the CBD. The indices (I, J and K), however, reflect only a moderate degree of clustering. It should be noted, though, that there is a grouping of Insurance establishments into two clusters, one to the south of Strand Street and the other in the Redevelopment Zone north of Waterkant Street (see Chapters 3 and 7). The southern cluster forms a crescent around part of the Retail Core (see Chapters 3 and 7) in Adderley Street.

Banks: Figure 5.3 shows that the weighted centre of gravity (WCG) for Banks lies close to that for all offices. The figure shows a concentration of Banks along the Adderley and St. Georges Street axes, and a more widely scattered distribution of a few generally smaller (less than 1,000 square metres) branches of Banks elsewhere in the CBD. The characteristics of the distribution of Banks are confirmed by the values of the indices (I, J and K). The indices demonstrate that whereas the 50 per

cent cluster is moderately concentrated about the WCG, the whole distribution is only marginally more clustered than are all offices ($K = 0.89$).

Other Finance: The WCG (Figure 5.4) lies two blocks to the south-west of that for all offices, and the inclusion boundaries confirm a strong concentration in the old city. The land use is almost entirely absent from the CBD periphery west of Long Street. Nevertheless, the indices suggest only a moderate degree of clustering for both the 50 per cent core and the whole Other Financial land use.

Building Societies: The pattern shown in Figure 5.5 indicates a concentration of Building Societies in lower St. Georges Street. The concentration is reflected in the location of the WCG about one block north-east of that for all offices. This land use is much less evenly distributed through the CBD than is banking. The indices (I, J and K) show Building Societies to be one of the more strongly clustered land uses. The 50 per cent core is clustered with respect to the whole Building Society distribution, which in turn is more highly clustered than are all offices.

Insurance Brokers: The WCG (Figure 5.6) lies about one block to the north of that for all offices. The inclusion boundaries confirm an apparent preference of this land use for a location in the Redevelopment Zone between Strand Street and Hans Strijdom Avenue. The land use is

largely absent from other areas of the CBD. The 'I', 'J' and 'K' index values indicate that the 50 per cent core of this land use is moderately clustered with respect to both Insurance Brokers as a whole and the office sector as a whole. The overall land use distribution is only slightly more clustered than are all offices ($K = 0.93$).

Estate Agents & Developers: Although the WCG (Figure 5.7) lies close to that of the office sector in general, the inclusion boundaries indicate that this land use is more concentrated in the Redevelopment Zone between Hans Strijdom Avenue and Castle Street than offices in general. The indices (I, J and K), though, show that the land use is only slightly more clustered than is the office sector as a whole.

Service Offices:

Lawyers: Figure 5.8 shows the WCG located three blocks to the south-west of that for all offices. The inclusion boundaries show that this land use is highly concentrated in and near the Retail Core of the CBD. There are only a few small occurrences in the area north of Strand Street and only four in the 18 blocks west of Long Street. This is reflected by the index values. These show that both the 'J' and 'K' indices fall in the first octile, indicating that both the 50 per cent core and the overall distribution are strongly clustered with respect to all offices.

Publishers: Figure 5.9 shows that the WCG is located one block

north of that for all offices. The majority of floor space in this land use is accounted for by three large firms located in the Wale Street to Greenmarket Square area and on the Foreshore. Smaller firms are widely distributed throughout the CBD. The index values which all fall in the fourth quartile, confirm the pattern of Publishing as relatively dispersed.

Engineers & Quantity Surveyors: Figure 5.10 shows the WCG located three blocks north-east of that for all offices. The inclusion boundaries confirm a concentration on the Foreshore, with only a few occurrences in the southern parts of the CBD. The indices (I, J and K) show that whereas the 50 per cent core of the distribution exhibits moderate clustering, the overall pattern is dispersed in comparison to that for all offices ($K = 1.16$).

Personal Services: The WCG is displaced two blocks to the south-west of that for all offices (Figure 5.11). The inclusion boundaries confirm that this land use is largely absent from the Foreshore. Personal Service firms avoid the southern periphery with a concentration in the Retail Core. The index values (I, J and K) suggest that the 50 per cent core is only moderately clustered with respect to the whole Personal Services distribution, but that it is moderately clustered with respect to all offices. The whole distribution is strongly clustered with respect to all offices, the

value of $K = 0.76$ falling in the first quartile.

Medical: The WCG (Figure 5.12) lies almost three and a half blocks to the north-east of that of the office sector as a whole. The inclusion boundaries confirm a strong preference for a Foreshore location, with 64 per cent of the total floor area being accounted for by just two buildings in that locality. For the remainder of the distribution, there is an almost total avoidance of the peripheral areas of the CBD. The index values confirm that while the whole distribution is more dispersed ($K = 1.19$) than are all offices, the 50 per cent core exhibits strong clustering. The 'I' index has a value of 0.42 (proportionately reduced) which falls in the first quartile of most strongly clustered cores.

Accountants: Figure 5.13 shows that this land use has a WCG that lies about one block north of that for all offices. In general accountants are concentrated in the Redevelopment Zone between Hans Strydom Avenue and Hout Street, although there are several occurrences south of that area. The indices (I, J and K) suggest that the land use distribution is only moderately clustered.

Business Services: Although Figure 5.14 indicates that this land use is present throughout the CBD, the WCG is located two blocks to the north-east of that for all offices. The inclusion boundaries indicate that the majority of the floor area in this land use is concentrated in the Redevelopment Zone between Hans Strijdom Avenue and Castle Street. The indices (I, J and K) reveal that

although the 50 per cent core of the distribution is moderately clustered, the whole land use has about the same degree of clustering as has the whole office sector.

Import/Export & Manufacturers Agents: Figure 5.15 indicates that the WCG is located one block to the south-west of that for the office sector as a whole. The inclusion boundaries show that there is a concentration in a circular belt around, and to some extent in, the Retail Core of the CBD. The land use is generally well represented in the peripheral areas of the CBD. The indices (I, J and K) suggest a relatively dispersed pattern, in that clustering about the WCG is weak. This does not contradict the suggestion that there is a concentration in a belt around the Retail Core of the CBD.

Computer Services: Figure 5.16 shows that the WCG is displaced two blocks north-east of that of the office sector as a whole. The inclusion boundaries indicate that, with the exception of the IBM building on Wale Street, 80 per cent of the floor area occurs north of Strand Street. In terms of the indices (I, J and K) the 50 per cent core is dispersed in relation to both the whole distribution, and the office sector. The whole Computer Services distribution has an index of $K = 0.96$, indicating marginally more clustering than is the case for all offices. To a large extent the indices are

influenced by the distance of the IBM building from the WCG.

Advertising: Figure 5.17 indicates that the WCG almost coincides with that for all offices. The land use is largely absent, however, from the Retail Core of the CBD, with a preference for Foreshore, Hans Strijdom Avenue to Strand Street and isolated southern periphery locations. The 'I', 'J' and 'K' indices fall into the fourth octile, indicating that both the 50 per cent core and the whole distribution is relatively dispersed.

Architects & Planners: Figure 5.18 shows that the WCG is displaced about two blocks west of that for all offices. The inclusion boundaries and the general distribution do not, though, show any particular locational pattern, other than a tendency to avoid the areas on both sides of the Gardens. The indices (I, J and K) reflect this by showing that Architects are no more clustered than are all offices.

Film & Entertainment: Figure 5.19 shows that the WCG is located two blocks west of that for the office sector as a whole. The inclusion boundaries confirm the tendency to concentrate linearly in the area between Loop and Burg Streets. This land use is almost absent from the Retail Core of the CBD. The indices (I, J and K) show that the land use is only moderately clustered.

Medical Suppliers: The WCG (Figure 5.20) is located about two blocks to the north-east of that of all offices.

Generally, Medical Suppliers tend to avoid the Retail Core of the city. The 'I', 'J' and 'K' indices fall into the fourth quartile indicative of the least clustered land uses. This is not so much an indication of a dispersed distribution, but the occurrence of a distribution different in form from that assumed by Davies' technique. The distribution follows an approximately crescent shaped pattern.

Clothing: The WCG is strongly displaced from that for the office sector as a whole being located four blocks due south in the vicinity of Church Square. The inclusion boundaries indicate that the land use has a limited distribution in the Retail Core area of the CBD, with a concentration in a few buildings located along the 'L' formed by Plein and Longmarket Streets. The land use is conspicuously absent in the western periphery and Foreshore. The index values (I, J and K) indicate that both the 50 per cent core and the distribution as a whole are strongly clustered with respect to all offices ($J = 0.42$, $K = 0.76$).

Commercial Offices:

Oil Companies: Figure 5.22 again shows a strong northward displacement of the WCG from the average position, with three quarters of the floor area accounted for by three buildings. The land use is strongly concentrated in the Foreshore area. The 'I' and 'J' indices lie in the first quartile indicating that the 50 per cent core is

strongly clustered. The 'K' index value of 0.89 suggest that the whole distribution is moderately clustered.

Retail Offices: Figure 5.23 shows that the WCG is located three blocks to the south-west of that for all offices. The main concentrations of retail office floor space are in Adderley and Plein streets. This land use is largely absent outside the Retail Core and is almost entirely absent from the Foreshore. The indices (I, J and K) show that the 50 per cent core is moderately clustered, but the whole distribution is strongly clustered ($K = 0.77$).

Industrial Company Offices: Figure 5.24 shows that the WCG is located close to that for all offices, while the inclusion boundaries show that the land use is widely distributed throughout the CBD. The pattern is confirmed by the index values which all lie in the fourth quartile. Thus both the 50 per cent core and the whole distribution are relatively dispersed.

Food Companies: Figure 5.25 shows the WCG located some five blocks north-east of that for all offices. The inclusion boundaries show that the land use is highly concentrated on the Foreshore, to the virtual exclusion of the remainder of the CBD. The indices (I, J and K) show that whereas the 50 per cent core of the distribution is strongly clustered with respect to the whole distribution ($I = 0.45$) and moderately clustered with respect to all offices. The 'K' index value of 1.14 suggests that it is dispersed, however, it should

be noted that the 'K' index value is disproportionately influenced by the few establishments distant from the WCG.

Transport Offices:

Shipping Companies: Figure 5.26 shows that the WCG is located almost four blocks north of the average position, while the inclusion boundaries demonstrate a strong cluster of Shipping Companies on the Foreshore. With two exceptions this land use is absent from the old city south of Waterkant Street. The 'I', 'J' and 'K' indices fall in the first quartile indicating that both the 50 per cent core and the whole distribution are strongly clustered about the WCG in relation to the offices sector as a whole.

Freight Services: Figure 5.27 indicates another strong northward displacement of the WCG, with the inclusion boundaries identifying a strong cluster of Freight Services on the Foreshore. This land use does not occur in the old city. The indices (I, J and K) show that the 50 per cent core is dispersed with respect to the whole Freight Services distribution, but that the whole distribution is strongly clustered with respect to all offices.

Airlines: Figure 5.28 shows that this comparatively minor land use has a WCG located three blocks north-west of that for all offices. The majority of these firms are located in close proximity to the railway station,

which includes the S.A. Airways terminal. The 'I', 'J' and 'K' indices fall in the first quartile indicating that both the 50 per cent core and the whole distribution are tightly clustered about the WCG.

Organizational Offices:

Professional & Institutional Bodies: Figure 5.29 indicates that the WCG is located close to that for all offices, and the inclusion boundaries are also similar to those for the office sector as a whole. There is some concentration in the Retail Core in the vicinity of Strand Street and also around the northern end of Plein Street. The indices suggest that the land use is only marginally more clustered than are all offices.

Educational Organizations: Figure 5.30 shows that the WCG is located within one block of the average for all offices. This is a relatively minor land use and the inclusion boundaries do not show any clear pattern, although there is a tendency to prefer the Retail Core area. The indices (I, J and K) show that the 50 per cent core is strongly clustered, although the whole distribution is only moderately clustered with respect to all offices.

Charities: Figure 5.31 shows the WCG located close to that for all offices. This land use avoids the Retail Core around the intersection of Strand and Aderley Streets, but is otherwise fairly evenly spread. The indices confirm that the 50 per cent core is only moderately clustered and that the whole distribution displays the

same degree of clustering as do all offices ($K = 1.01$).

Government Offices:

Local & National Government: Figure 5.32 shows that the WCG is displaced two blocks south-east of that for all offices. Both the inclusion boundaries and the distribution as a whole show that this land use is concentrated in the southern, eastern and northern periphery of the CBD. With a few minor exceptions this land use is absent from the whole of the Retail Core and western periphery. The index values suggest that this land use is dispersed, but this is mainly due to the form adopted by the distribution being different to the type assumed by Davies' technique.

Diplomatic: Figure 5.33 shows that this land use has a WCG that lies two blocks north-east of that for all offices. The inclusion boundaries confirm the slight tendency toward a Foreshore location, but also show concentrations in the old city. The western periphery is, however, almost devoid of the land use. The index values indicate that the 50 per cent core of the distribution is dispersed, although the distribution as a whole is marginally more clustered than are all offices.

Vacancy: Figure 5.34 shows that the WCG is located two blocks away from that for all offices in a westerly direction. The inclusion boundaries do not show any clear pattern other than the fact that vacancy is generally lower than average on the Foreshore. The indices suggest that

TABLE 5.1

INDICES OF CLUSTERING ABOUT THE WEIGHTED CENTRE OF GRAVITY

CATEGORY	INDEX 'I'	INDEX 'J'	INDEX 'K'
ALL OFFICES	0.82	0.82	1.00
1A	0.66	0.56	0.85
1B	0.55	0.49	0.89
1C	0.60	0.54	0.90
1D	0.39*	0.25*	0.64*
1E	0.49	0.45	0.93
1F	0.69	0.65	0.93
2A	0.54	0.40*	0.74*
2B	1.39+ (1.03)+	1.49+ (1.11)+	1.08+ (67% of Area) Reduced by 50/67
2C	0.53	0.61	1.16+
2D	0.64	0.49	0.76*
2E	0.54 (0.42)*	0.63 (0.49)	1.19+ (64% of Area) Reduced by 50/64
2F	0.65	0.59	0.91
2G	0.51	0.50	0.97
2H	0.78+	0.78+	1.01
2I	0.87+	0.84+	0.96
2K	0.73+	0.80+	1.09+
2L	0.60	0.59	0.97
2M	0.66	0.58	0.88
2N	0.79+	0.83+	1.05+
2O	0.55	0.42*	0.76*
3A	0.47*	0.42*	0.89
3B	0.60	0.47	0.77*
3C	0.80+	1.00+	1.24+
3D	0.45*	0.52	1.14+
4A	0.22*	0.16*	0.72*
4B	0.74+	0.49	0.66*
4D	0.20*	0.13*	0.65*
5A	0.72	0.70	0.97
5B	0.35*	0.30*	0.87
5D	0.62	0.63	1.01
6A & 6B	0.71	1.01+	1.43+
6C	1.00+	0.96+	0.96
7A	0.46*	0.38*	0.82

* First Quartile - Most strongly clustered.

+ Fourth Quartile - Least strongly clustered.

TABLE 5.2

GROSS CONSTRUCTION AREA BY LAND USE

OFFICE LAND USES	TOTAL AREA	NON-OFFICE USES	TOTAL AREA
------------------	------------	-----------------	------------

1A	109,115		
1B	85,735		
1C	56,682	PARKING	250,874
1D	32,195		
1E	24,750	VACANT SITES	2,871
1F	24,013	CONSTRUCTION SITES	18,344

2A	58,292	RETAIL	270,732
2B	47,420		
2C	37,203	FACTORY	20,464
2D	36,231		
2E	36,128	MUSEUMS	2,062
2F	35,868		
2G	34,206	CHURCHES	2,689
2H	34,184		
2I	25,875	MOTOR SHOWROOM	24,899
2K	23,048		
2L	19,831	HOTEL	63,765
2M	13,363		
2N	9,349	RESIDENTIAL	10,497
2O	6,782	OTHER	70,729

3A	63,303		
3B	61,706		
3C	50,507		
3D	23,747	ALL LAND USES	2,310,456
3E	5,650		
3F	4,272	UNDEVELOPED FORESHORE SITES	38,196

4A	19,948
4B	9,023
4C	8,443
4D	4,123

All figures are in square metres. Grand totals may vary slightly due to the effects of rounding off to whole numbers.

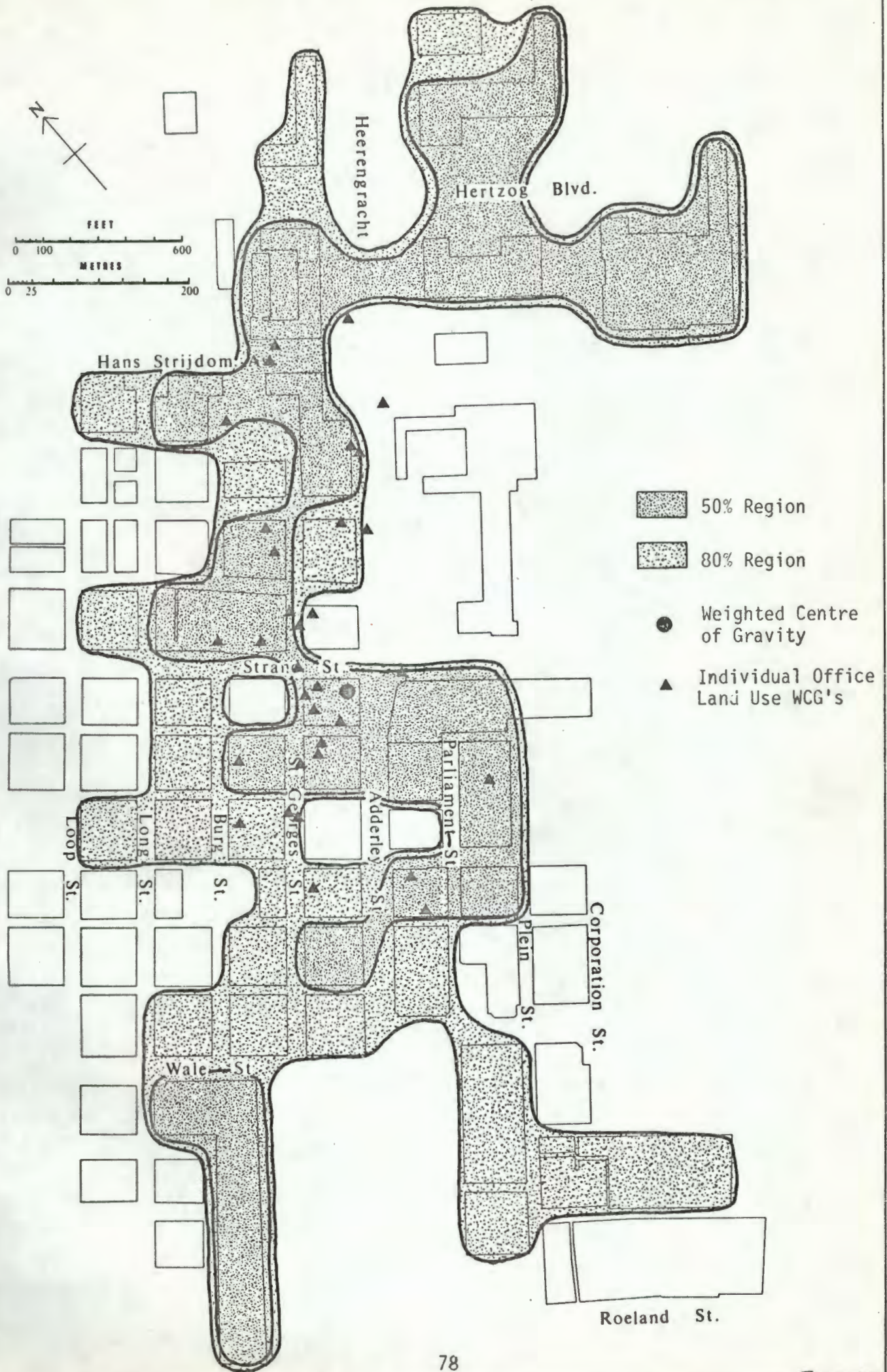
5A	18,283
5B	11,312
5C	6,951
5D	5,314

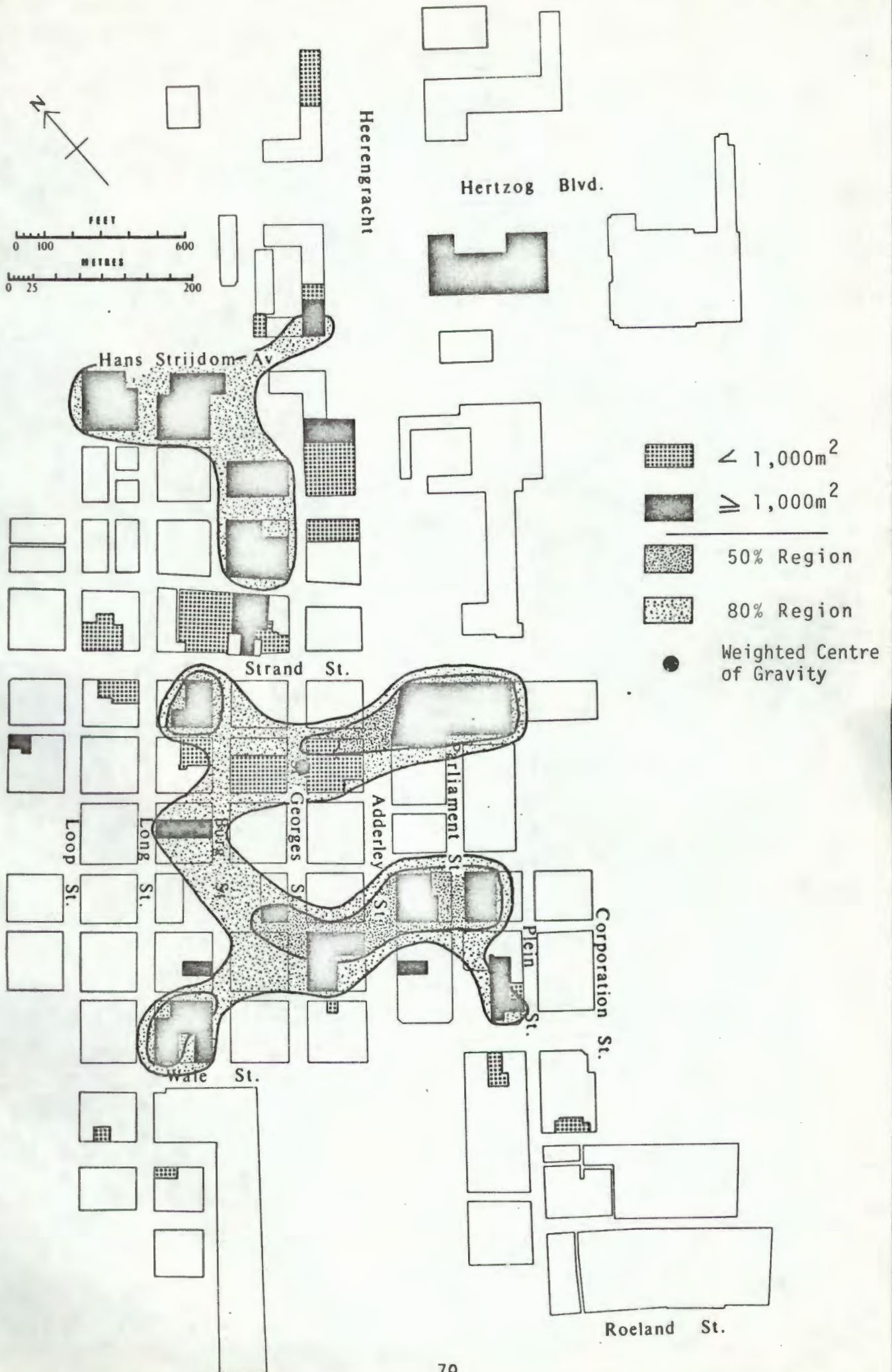
6A	210,538
6B	193,567
6C	12,963

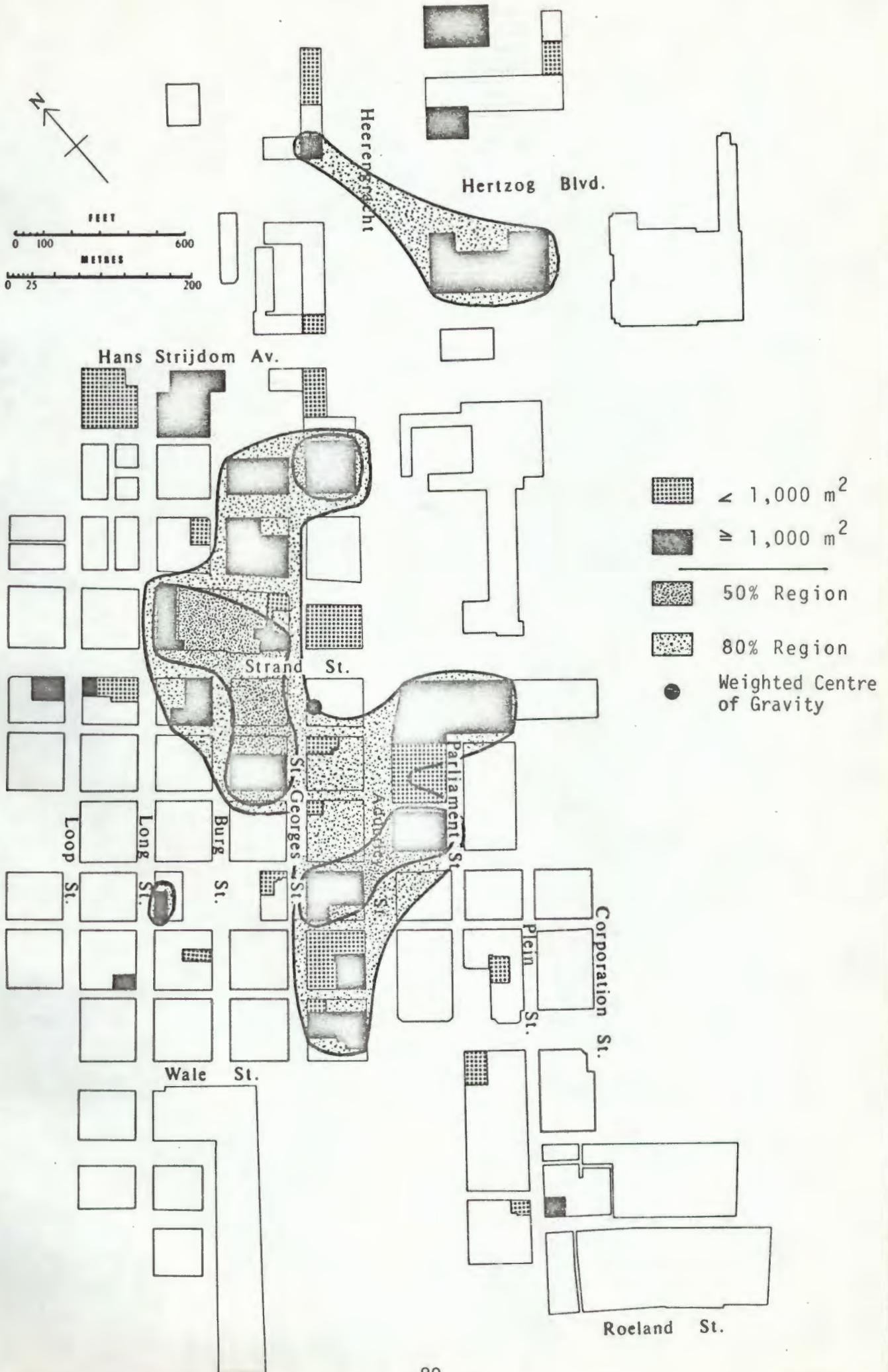
7A	106,320
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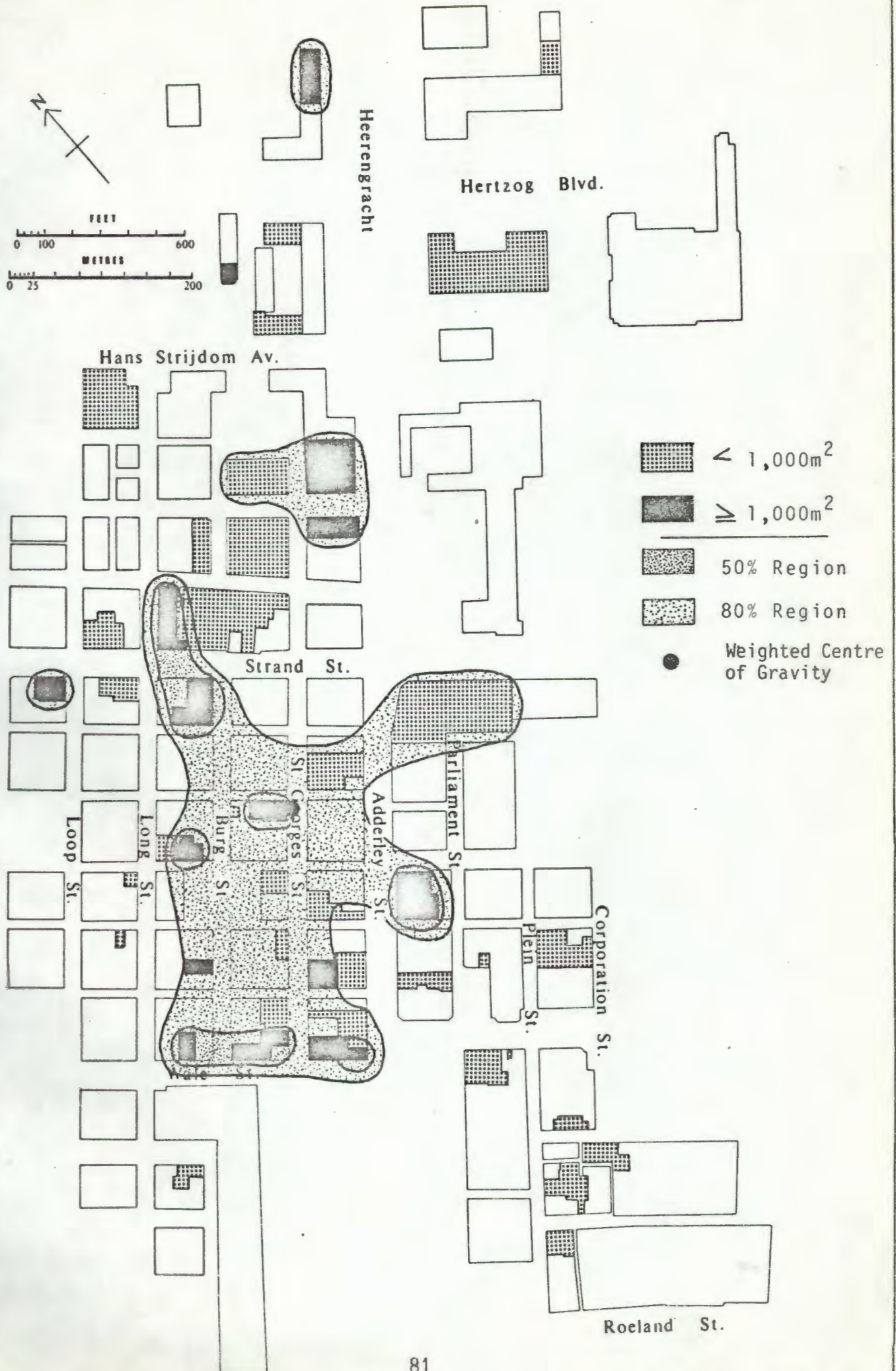
UNKNOWN OFFICES	5,886
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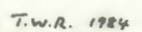
TOTAL OFFICES	1,572,384
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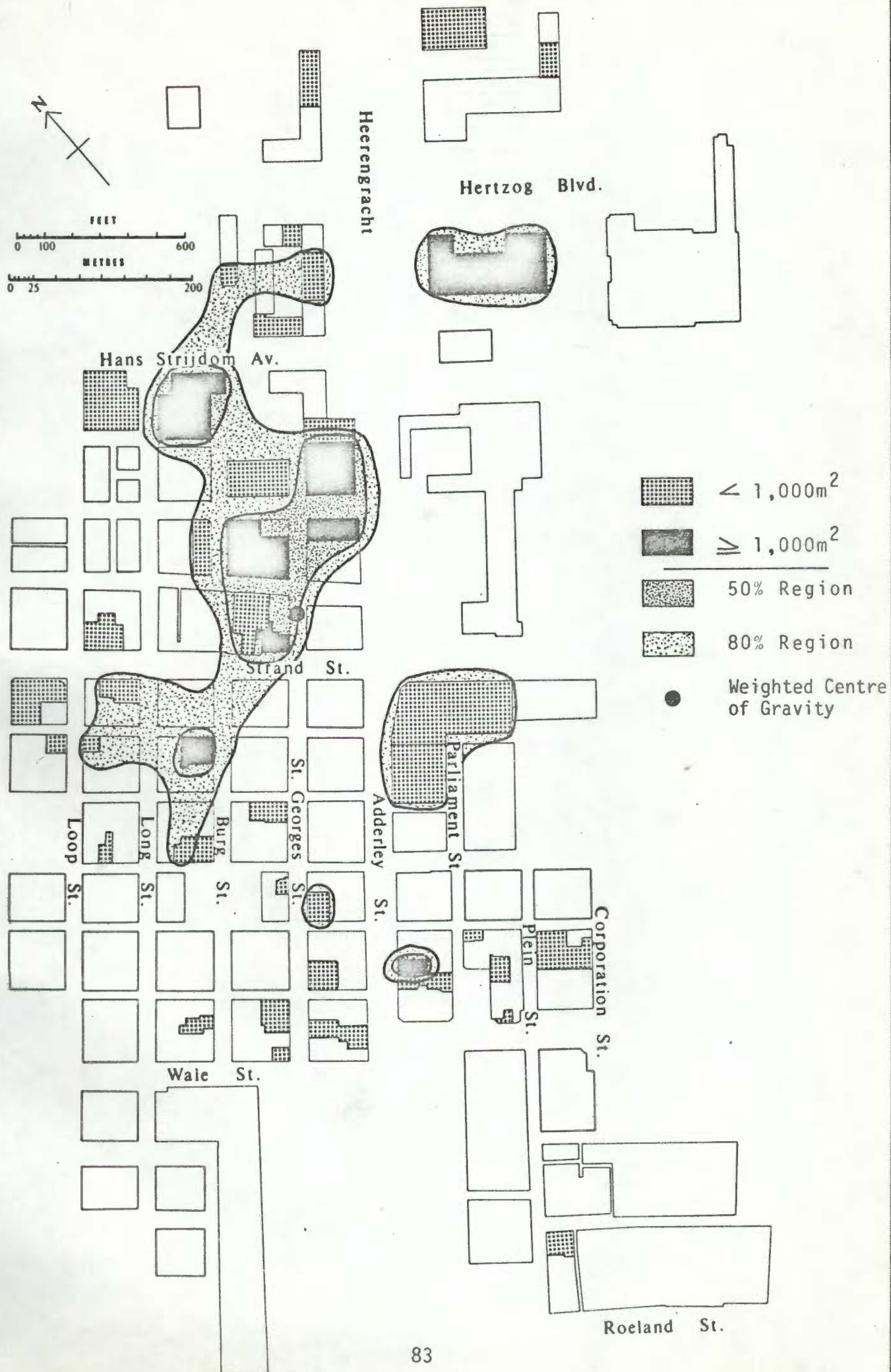


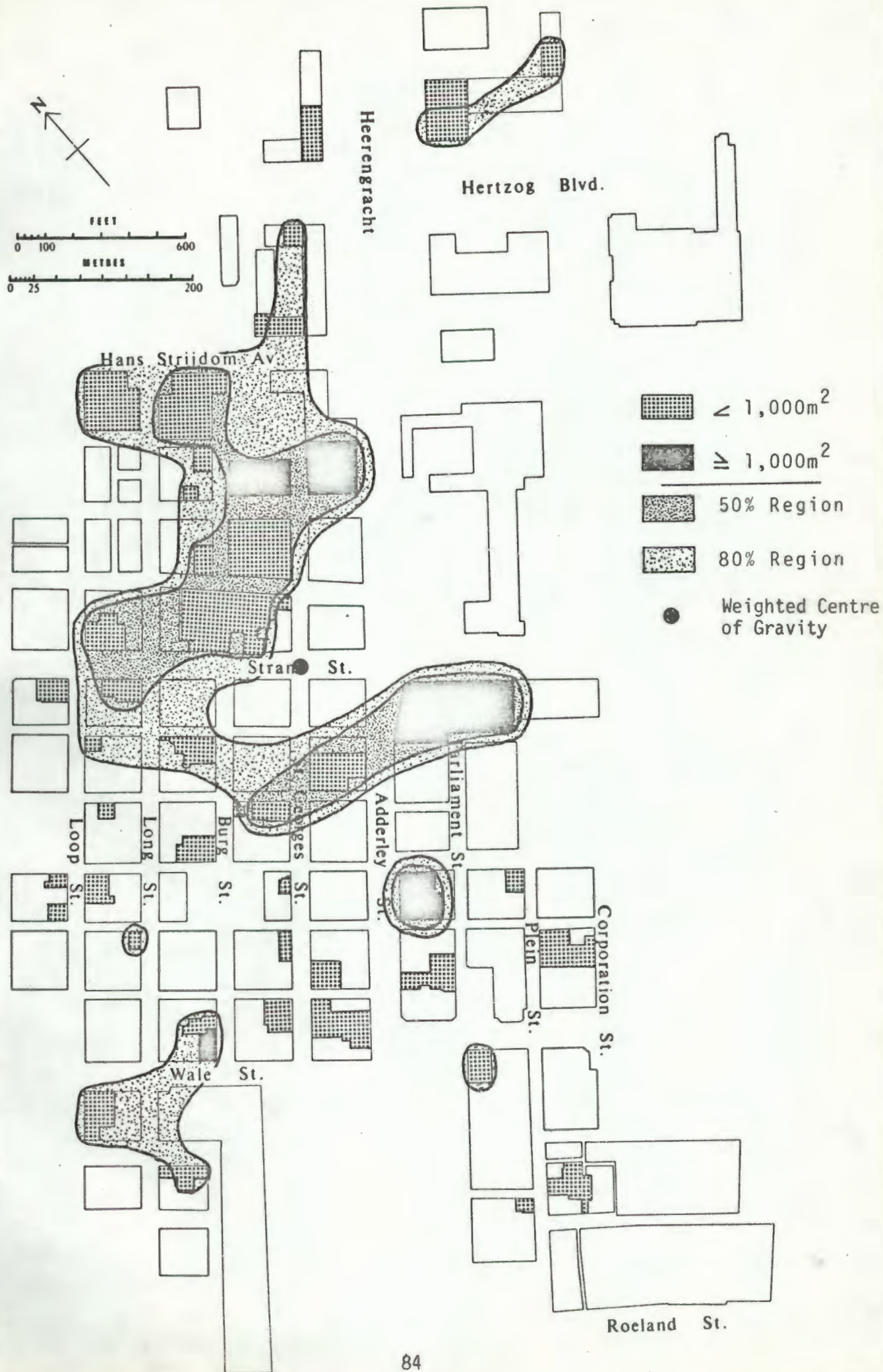


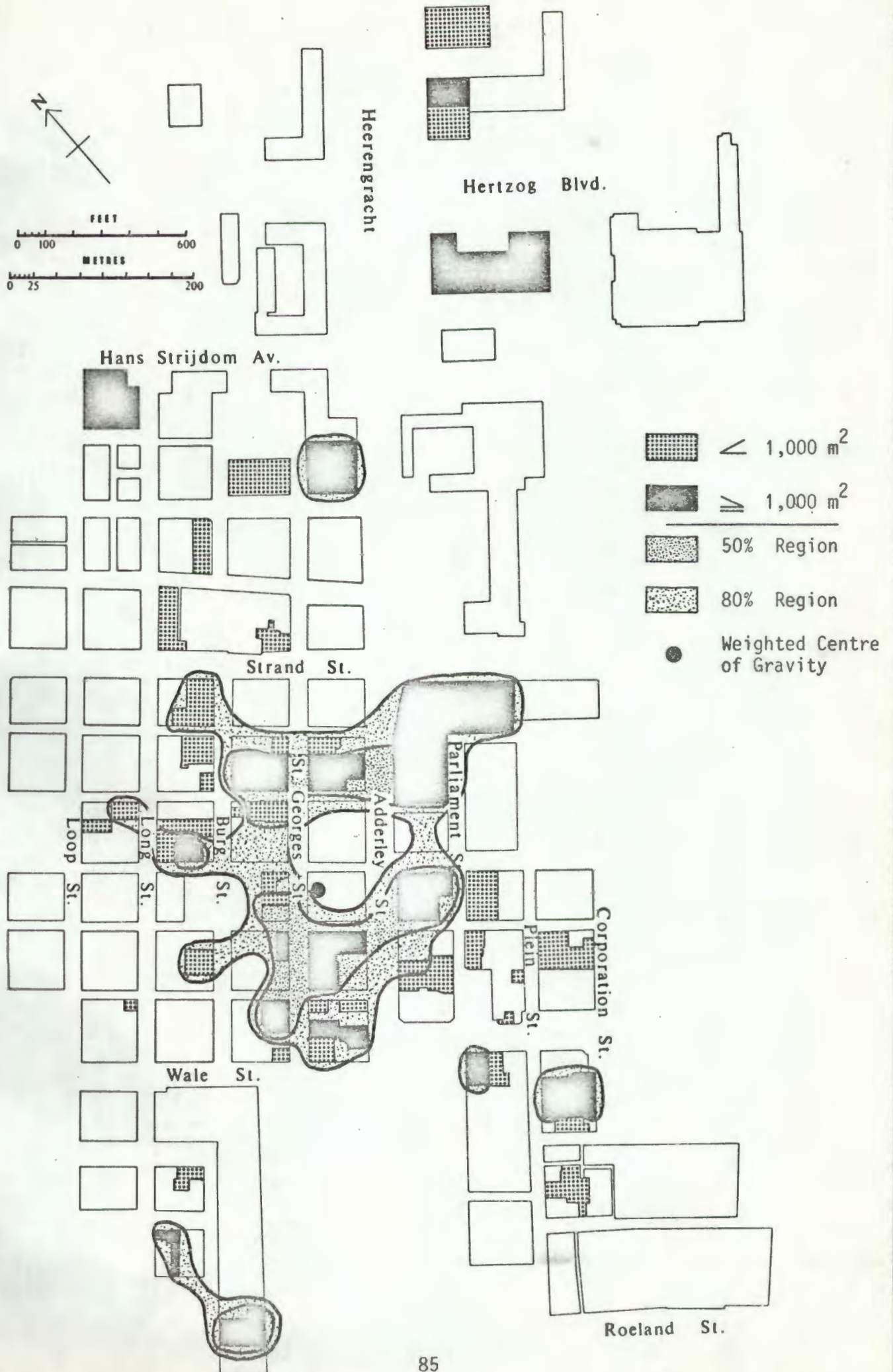


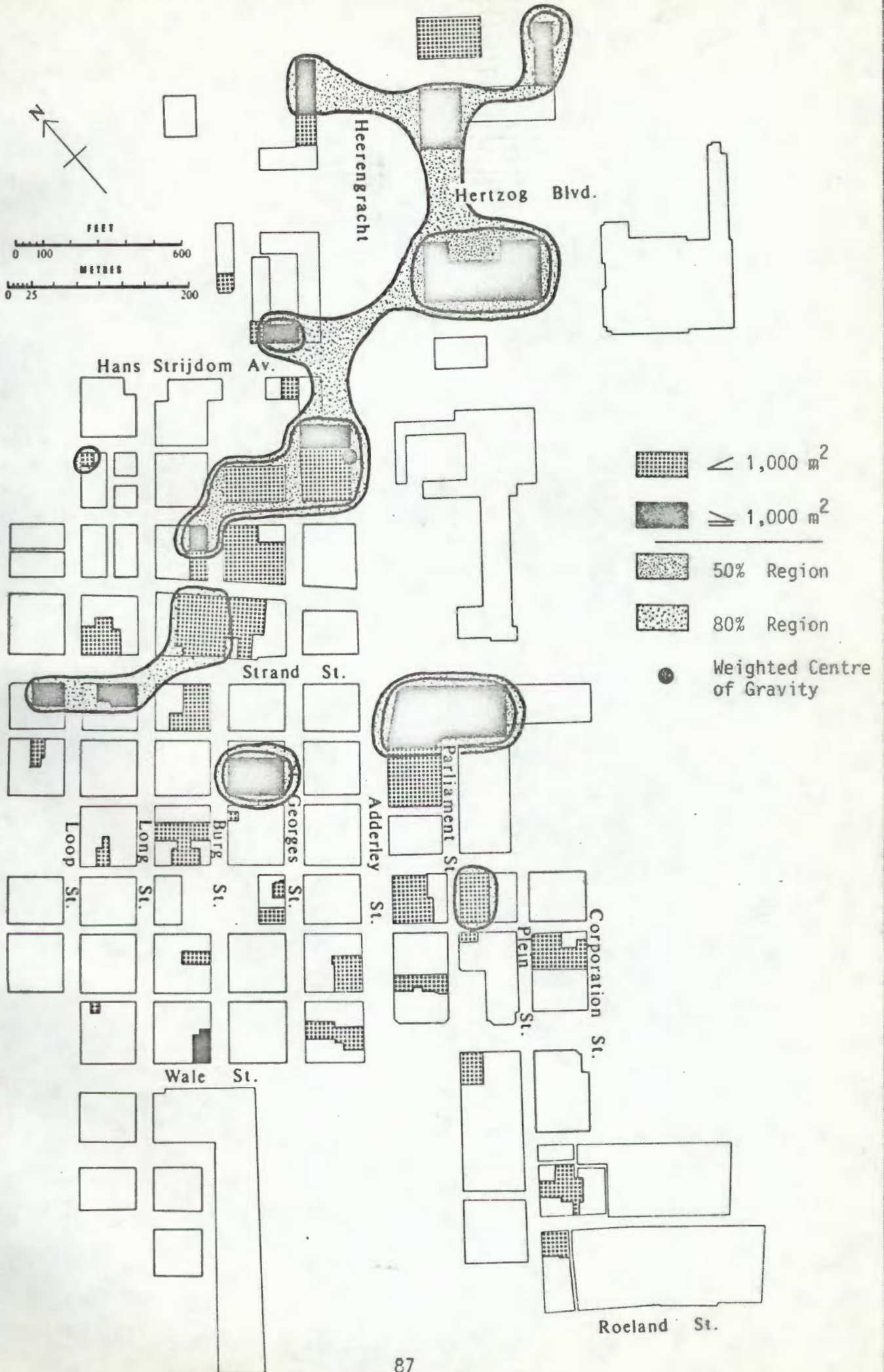


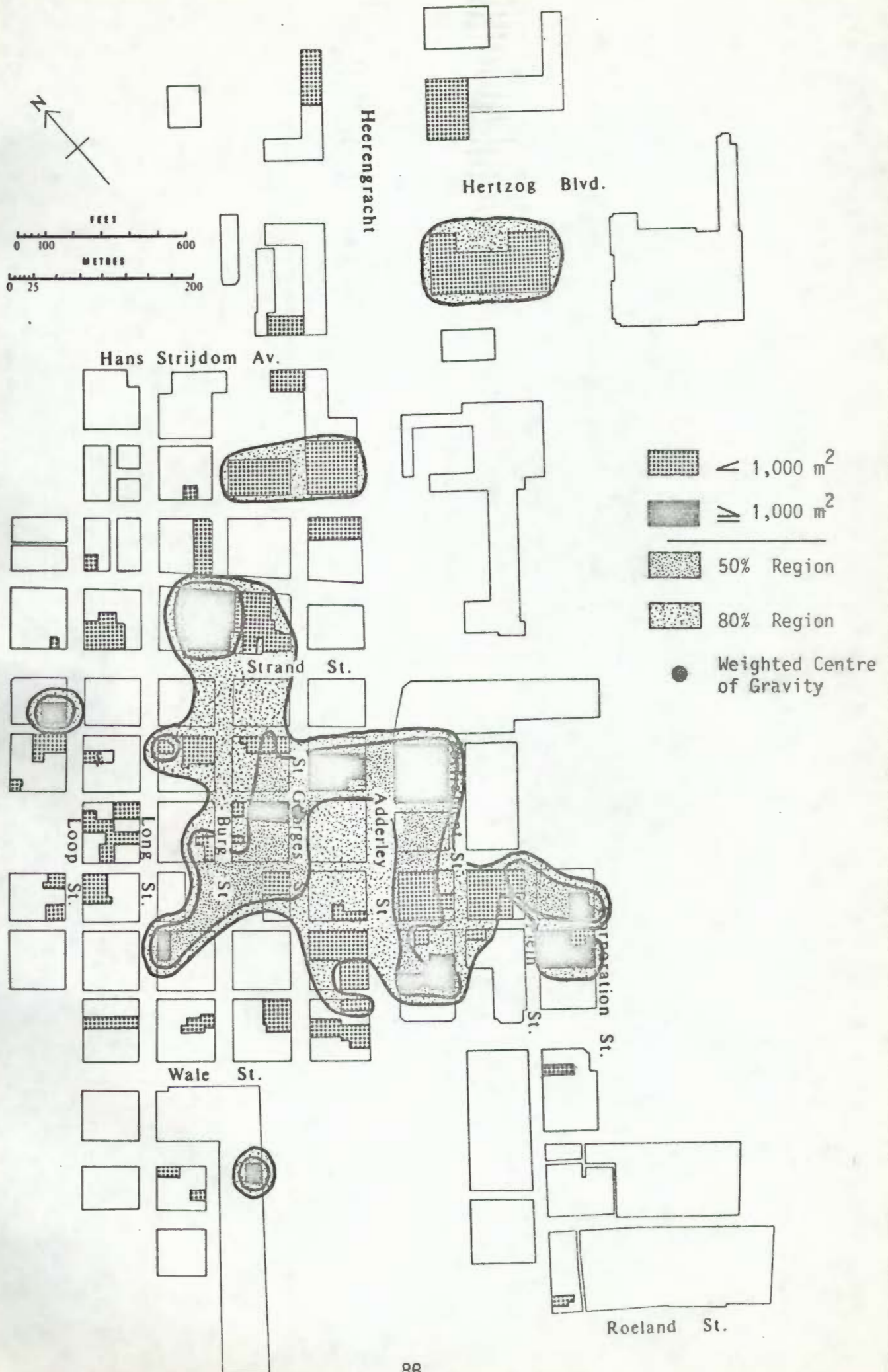


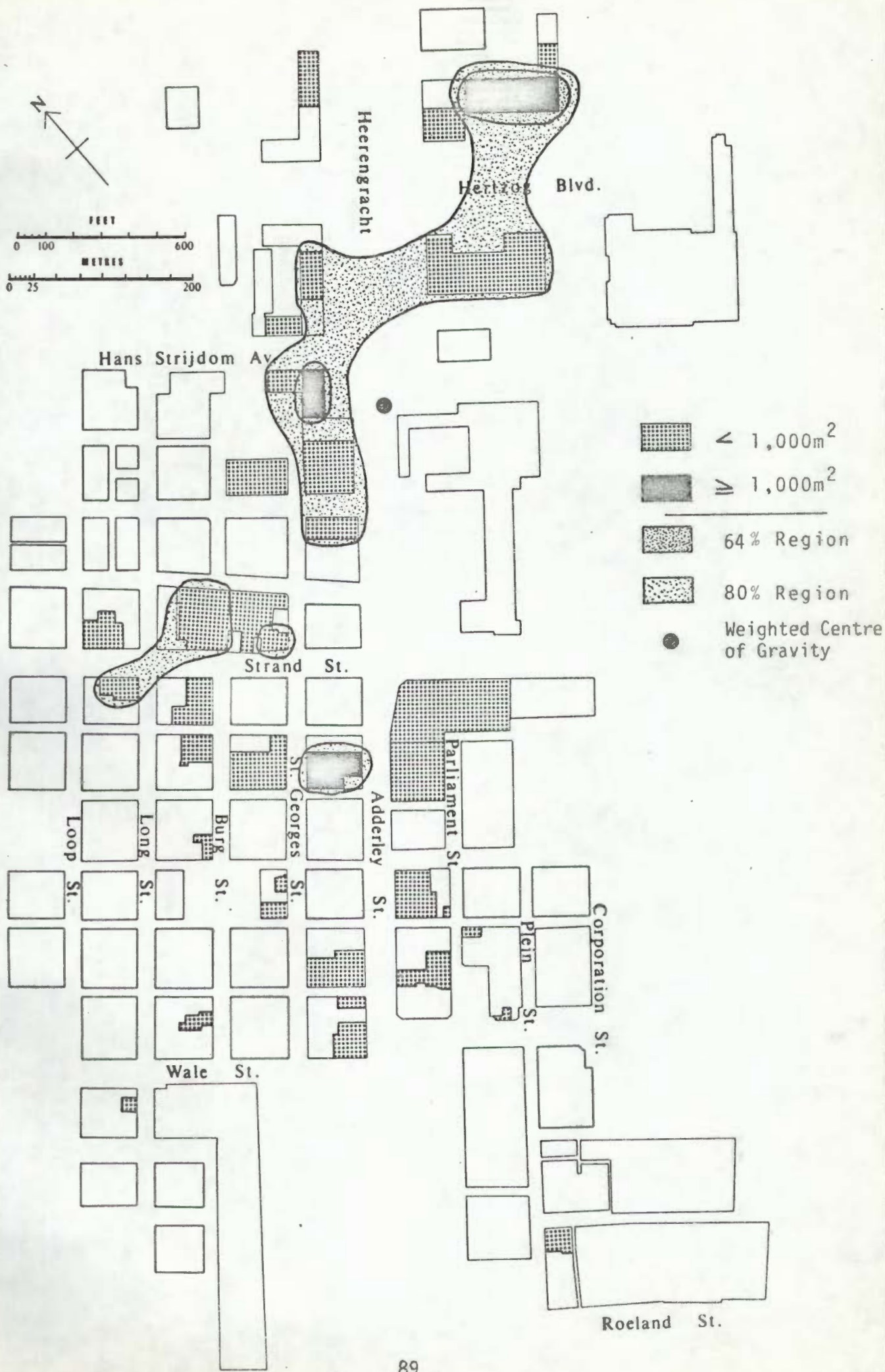


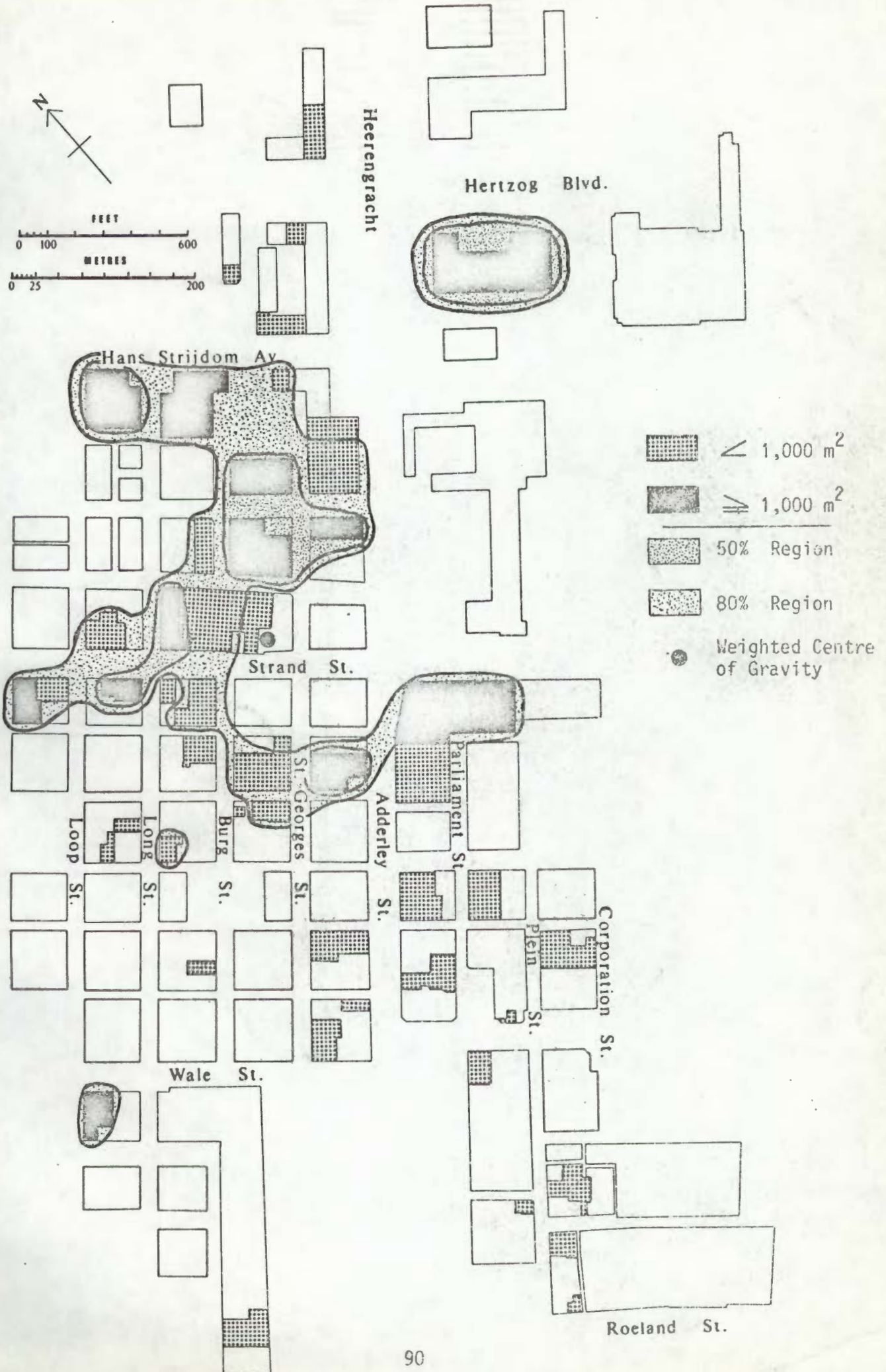


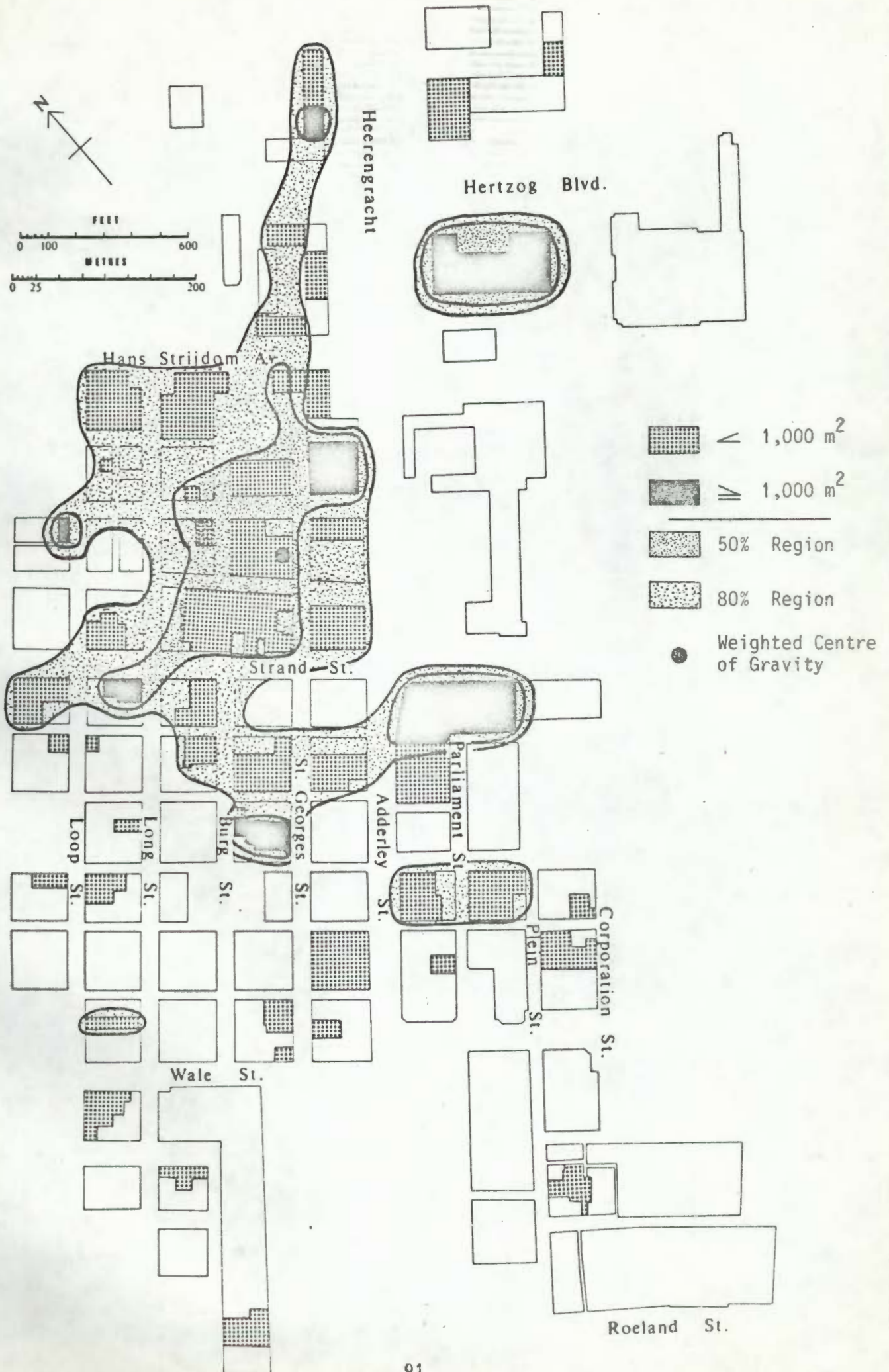


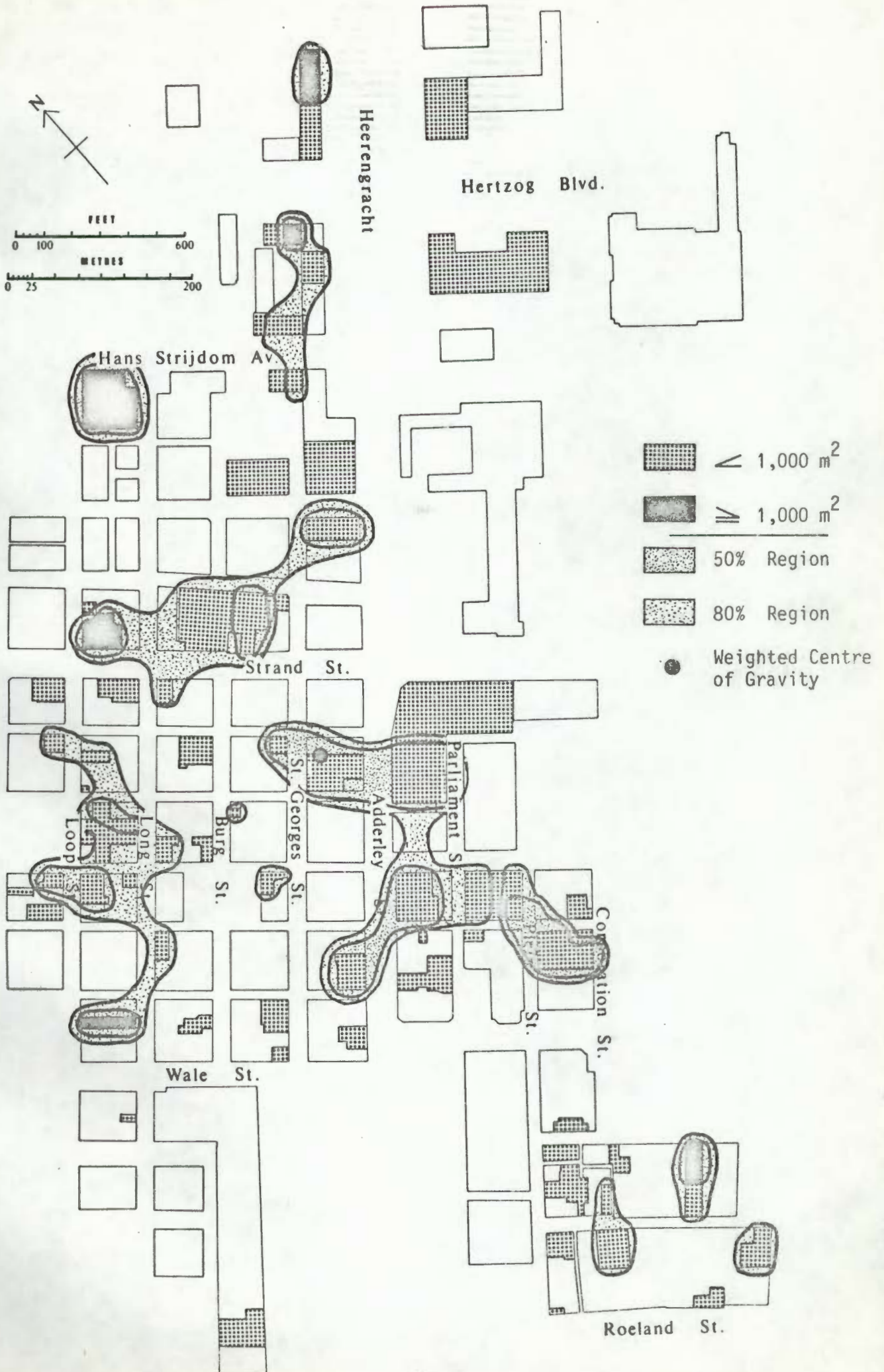


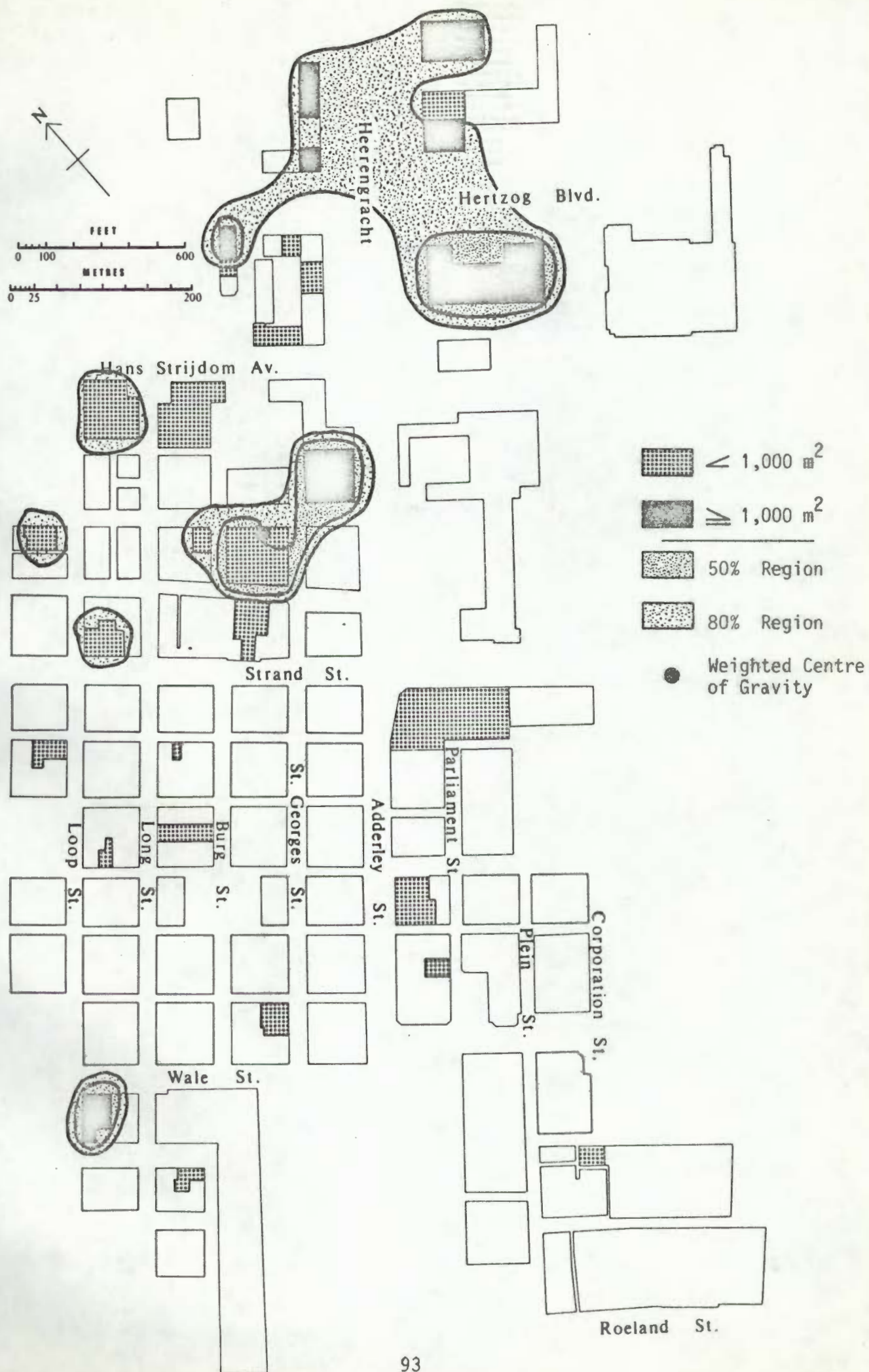


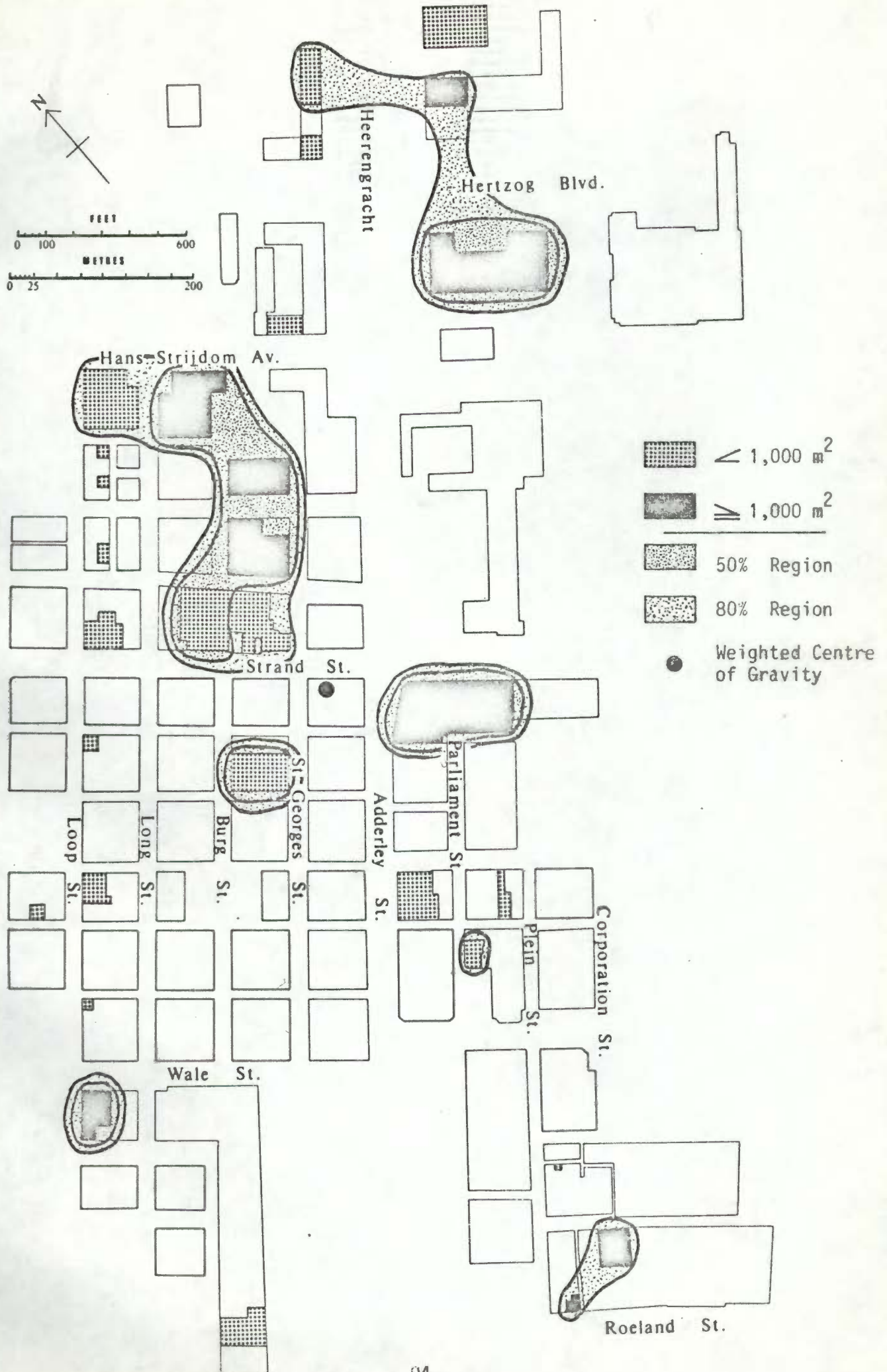


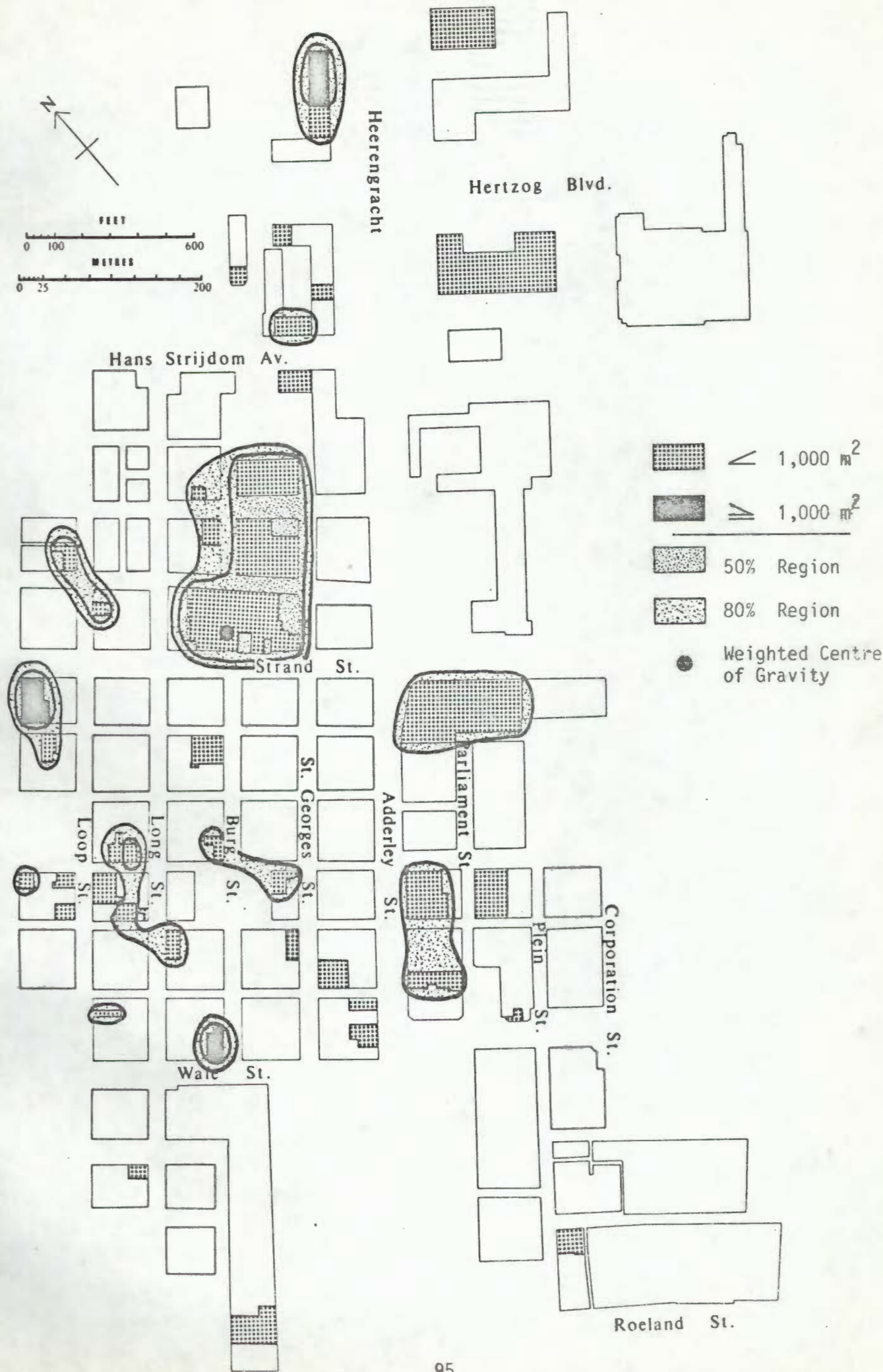


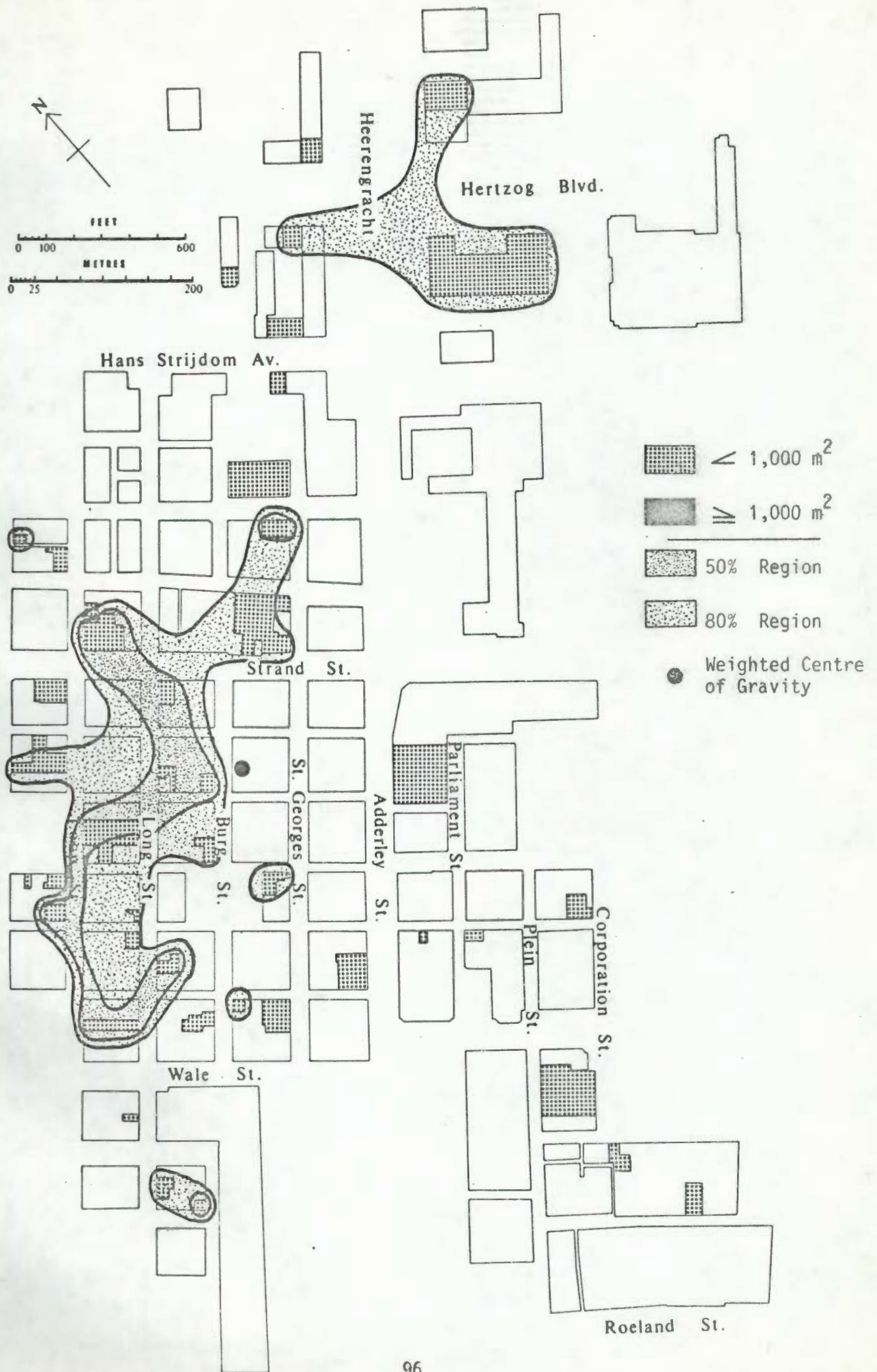


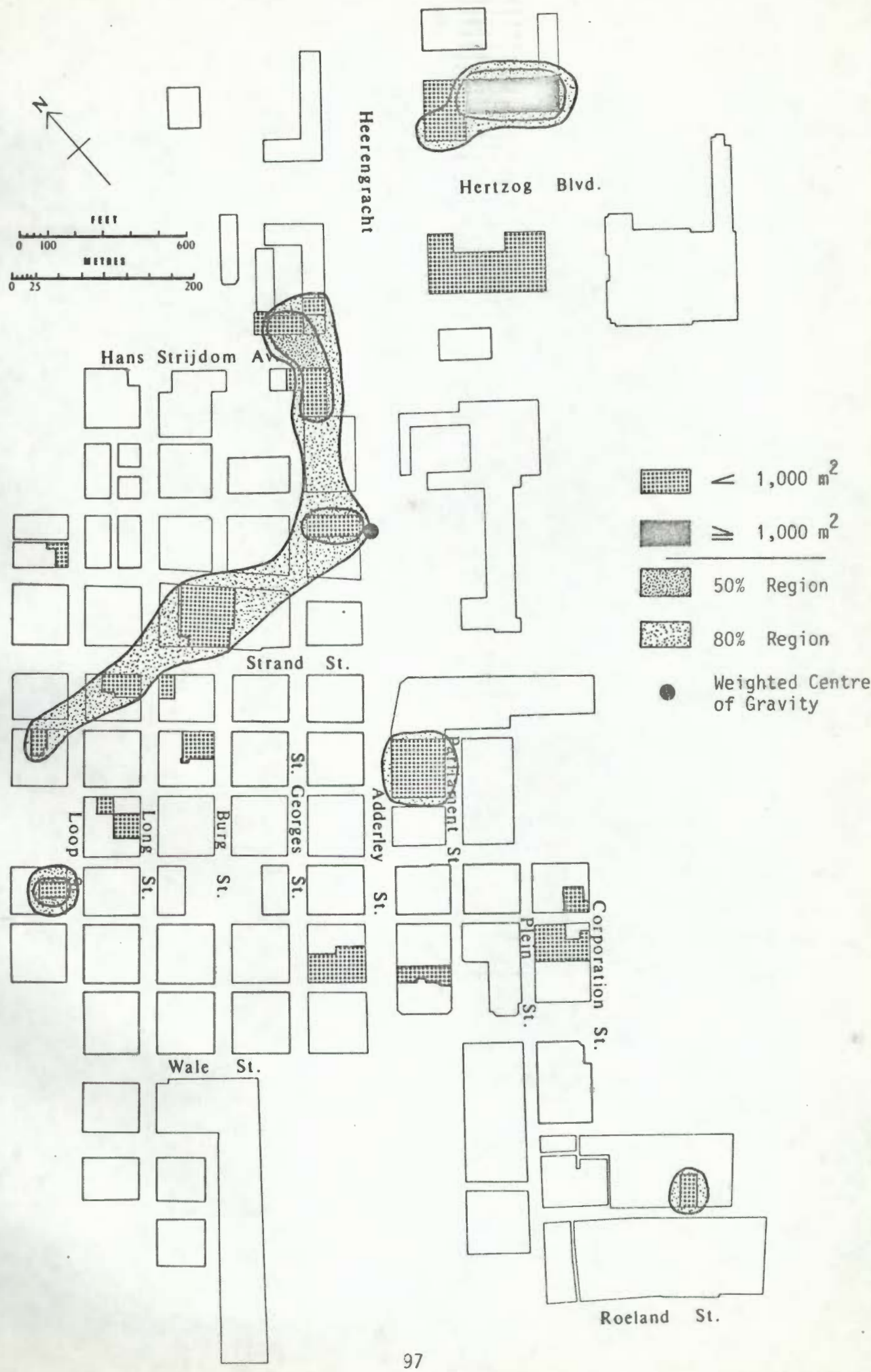






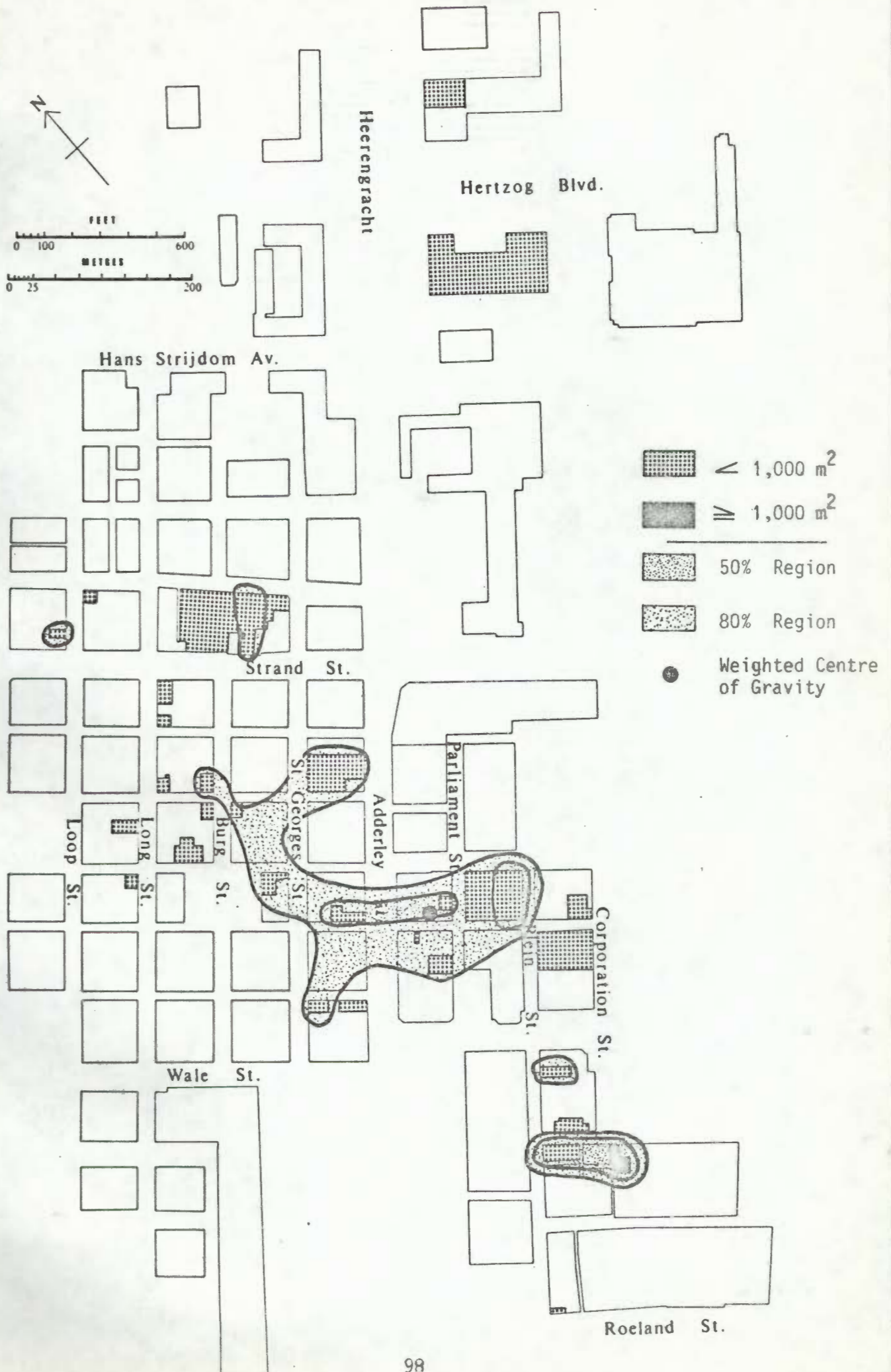


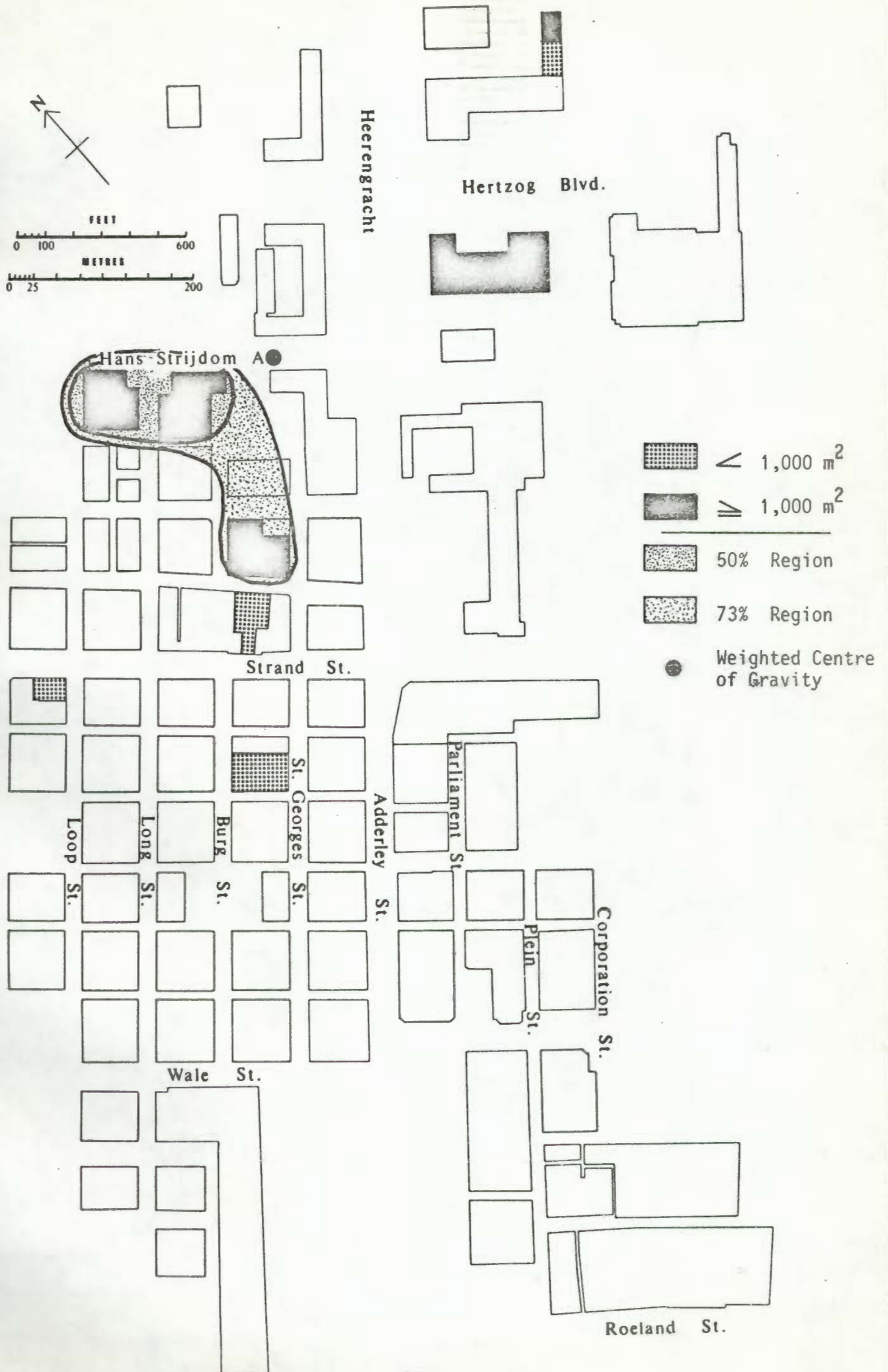


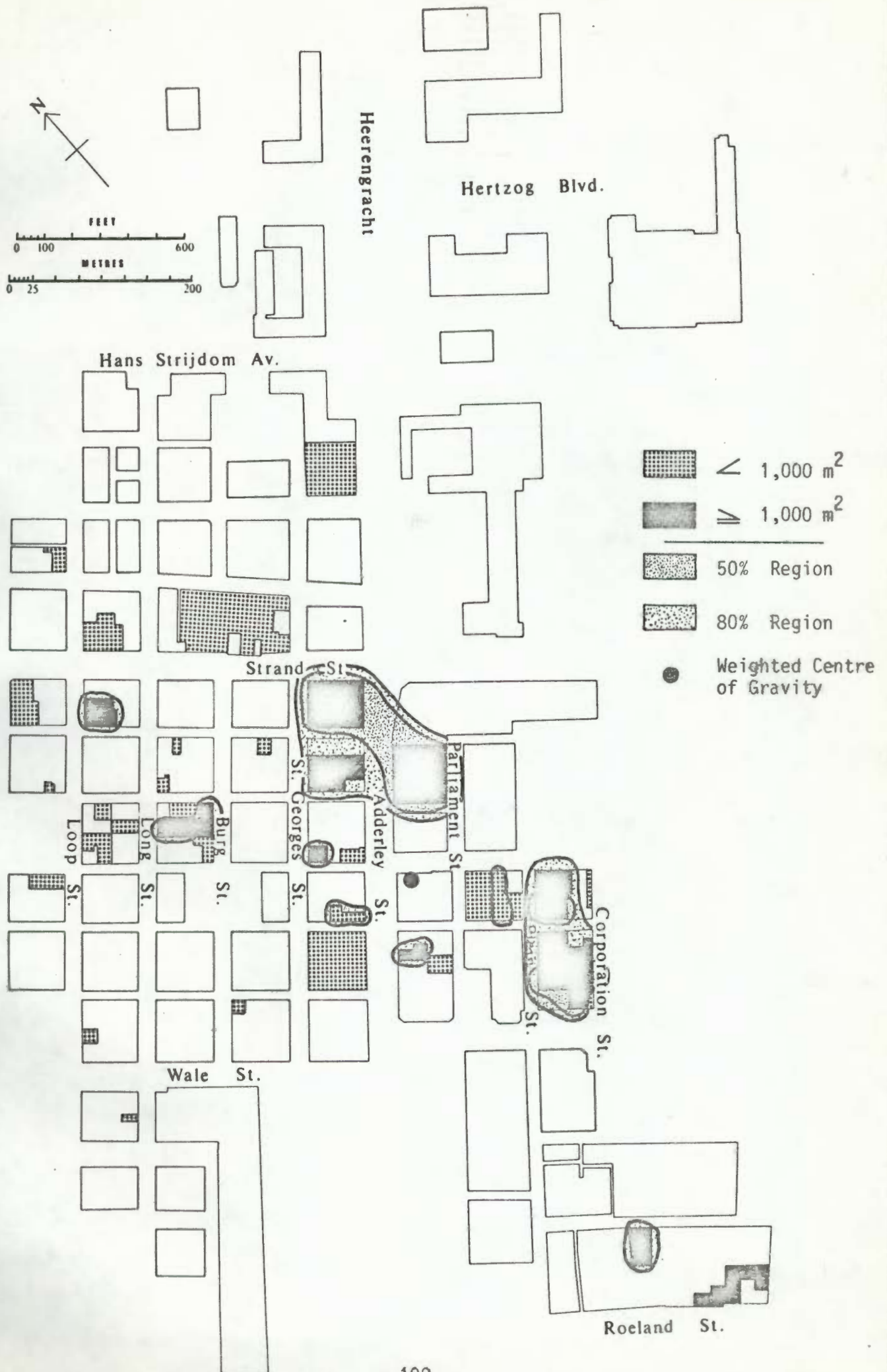


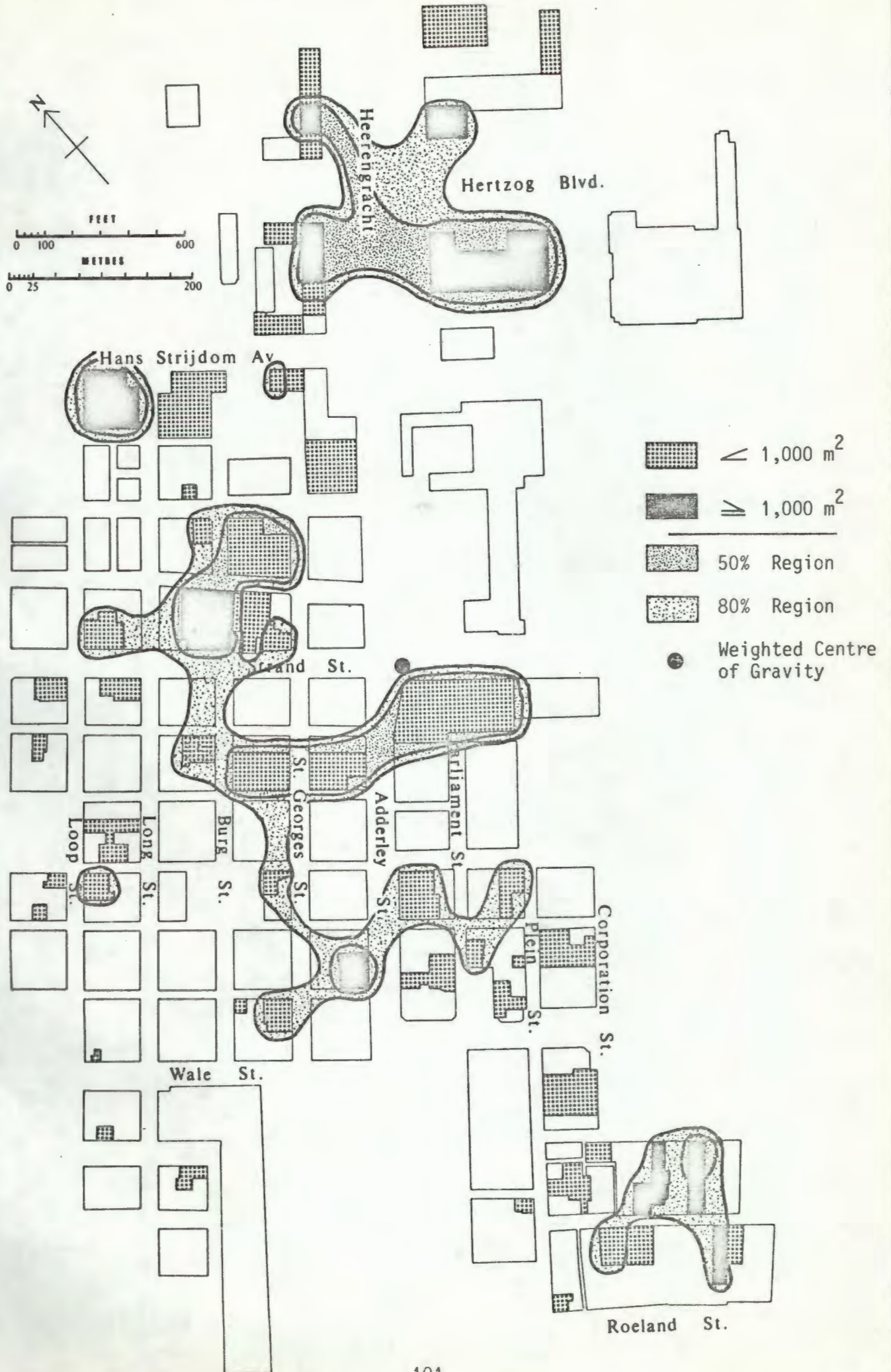
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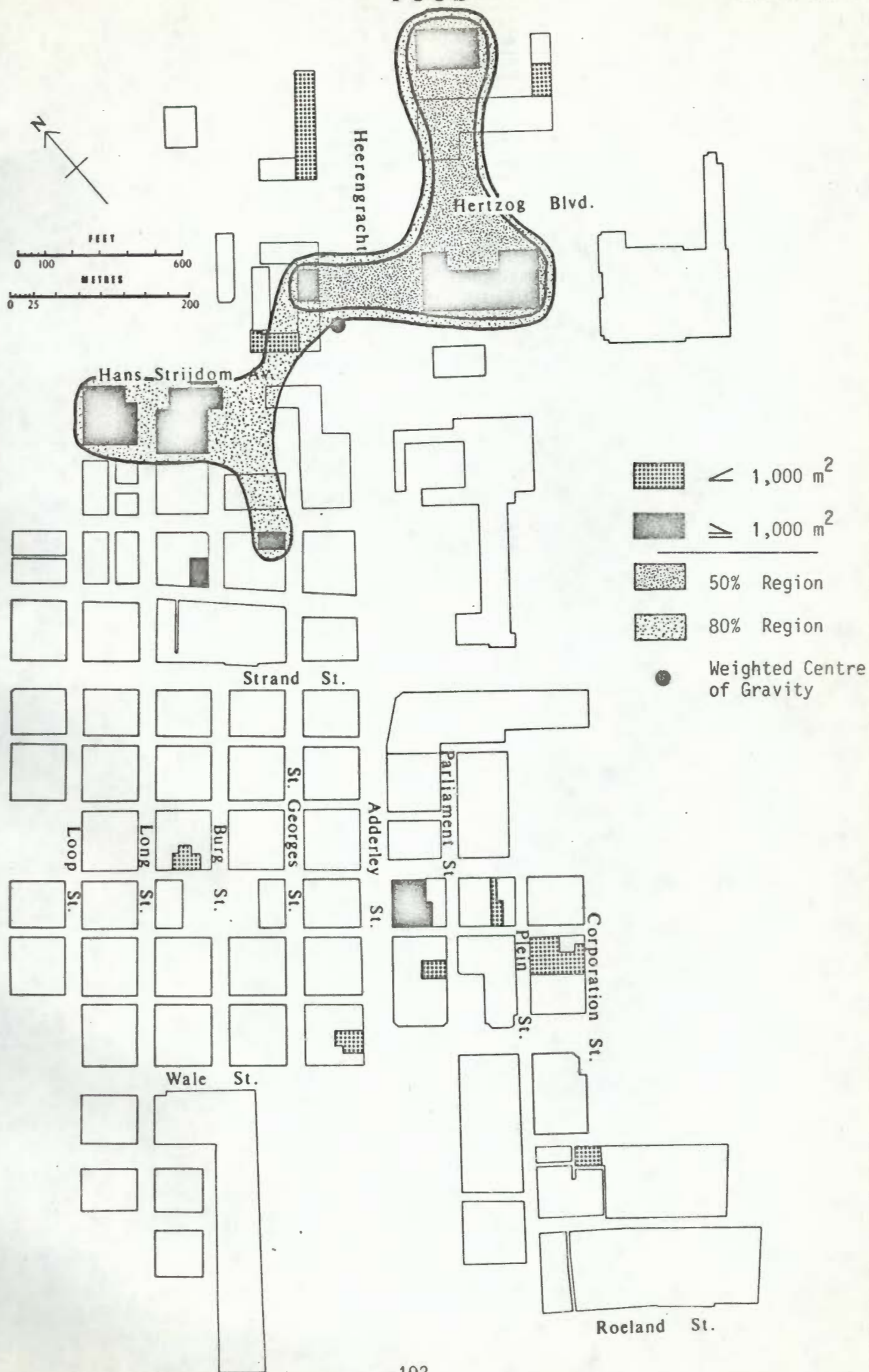
FIGURE 5.21

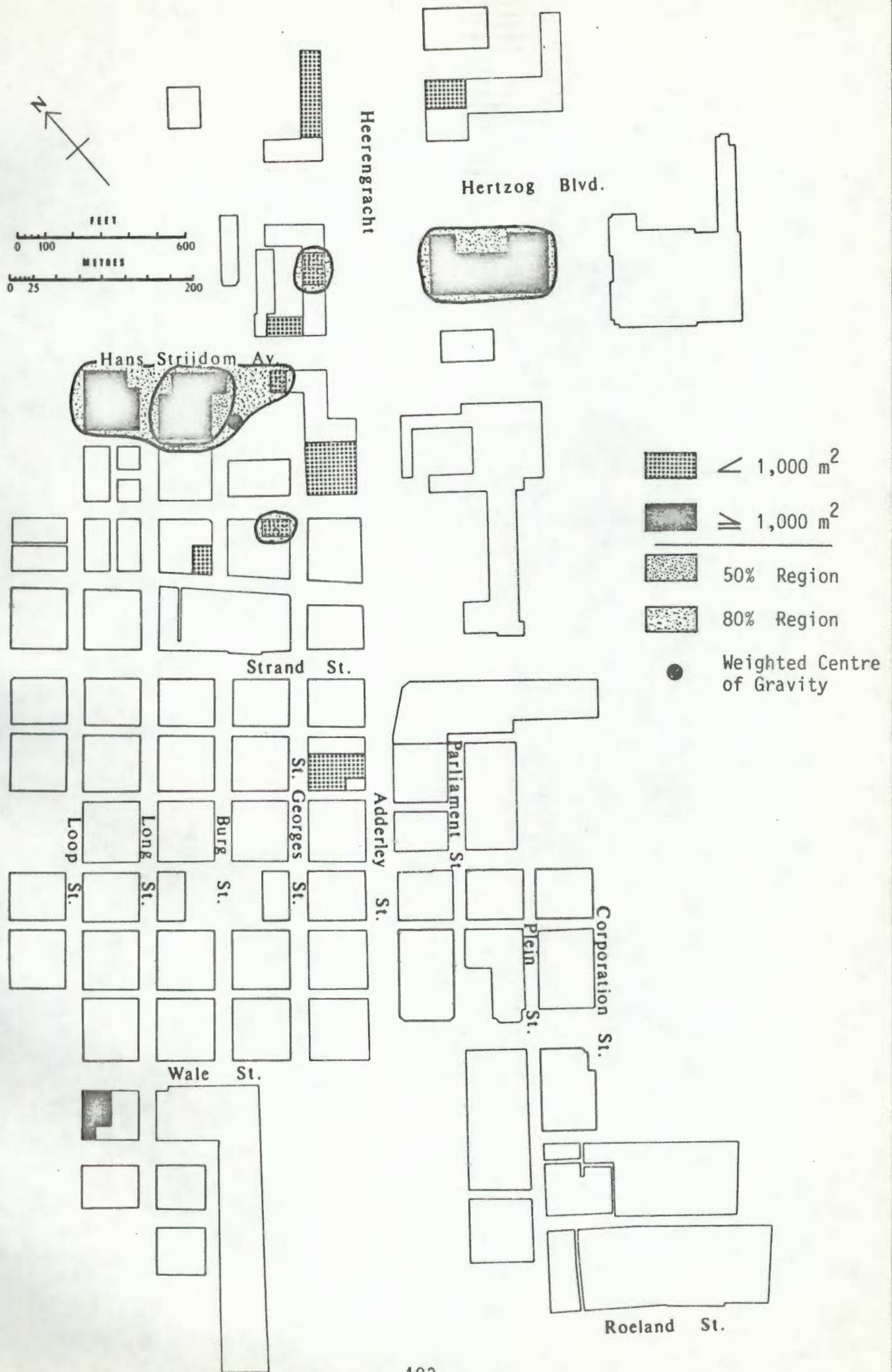


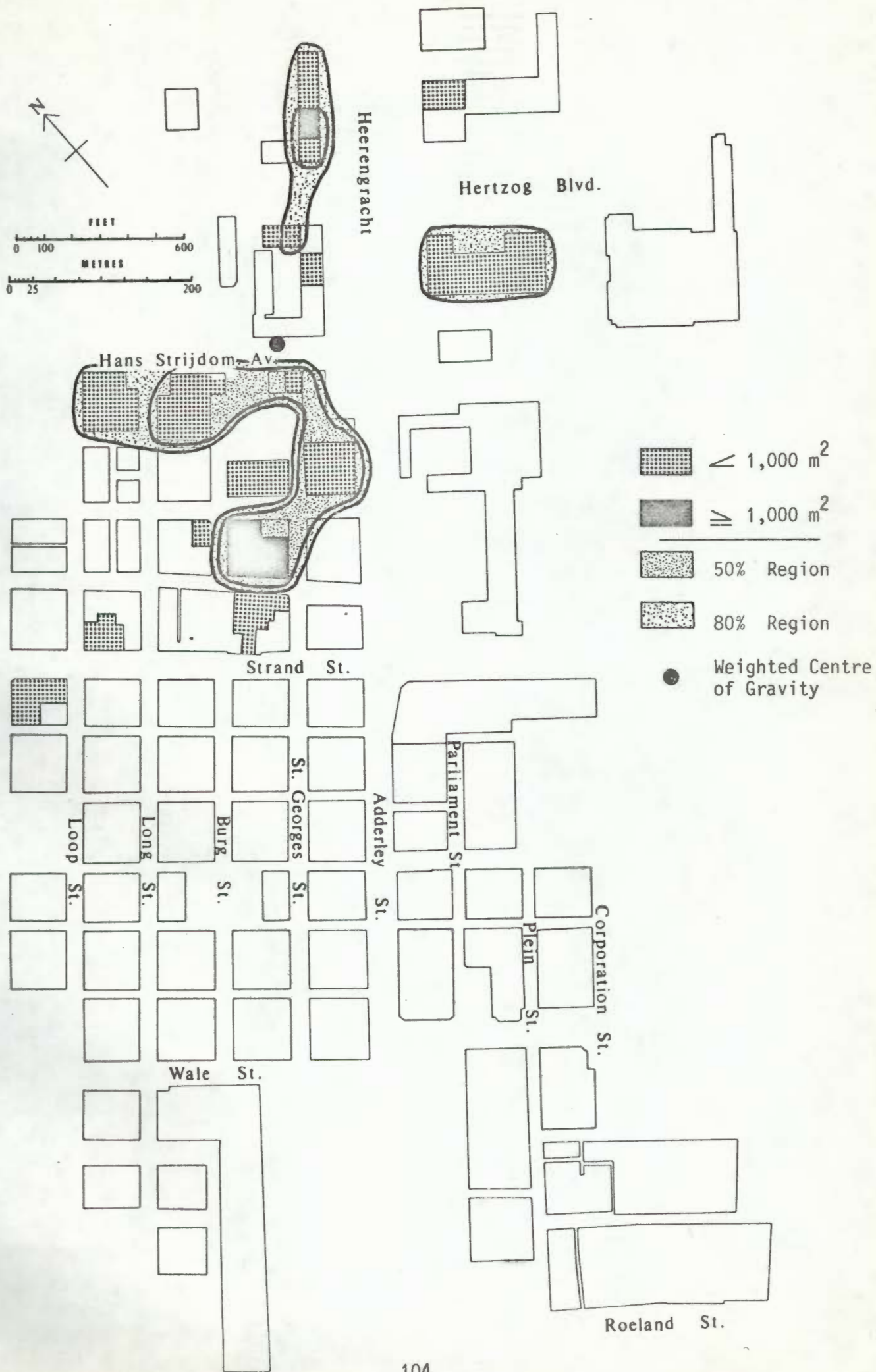


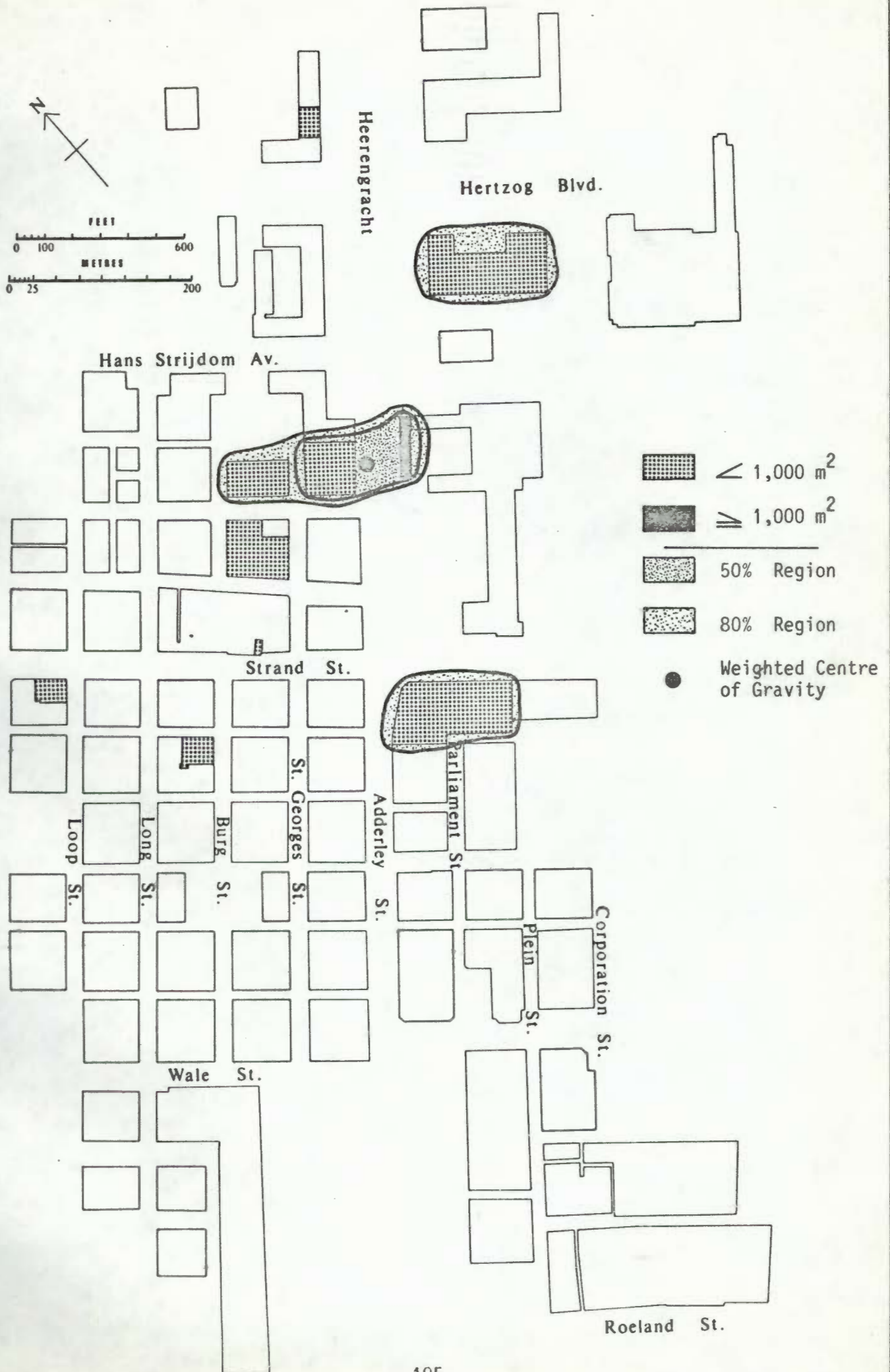


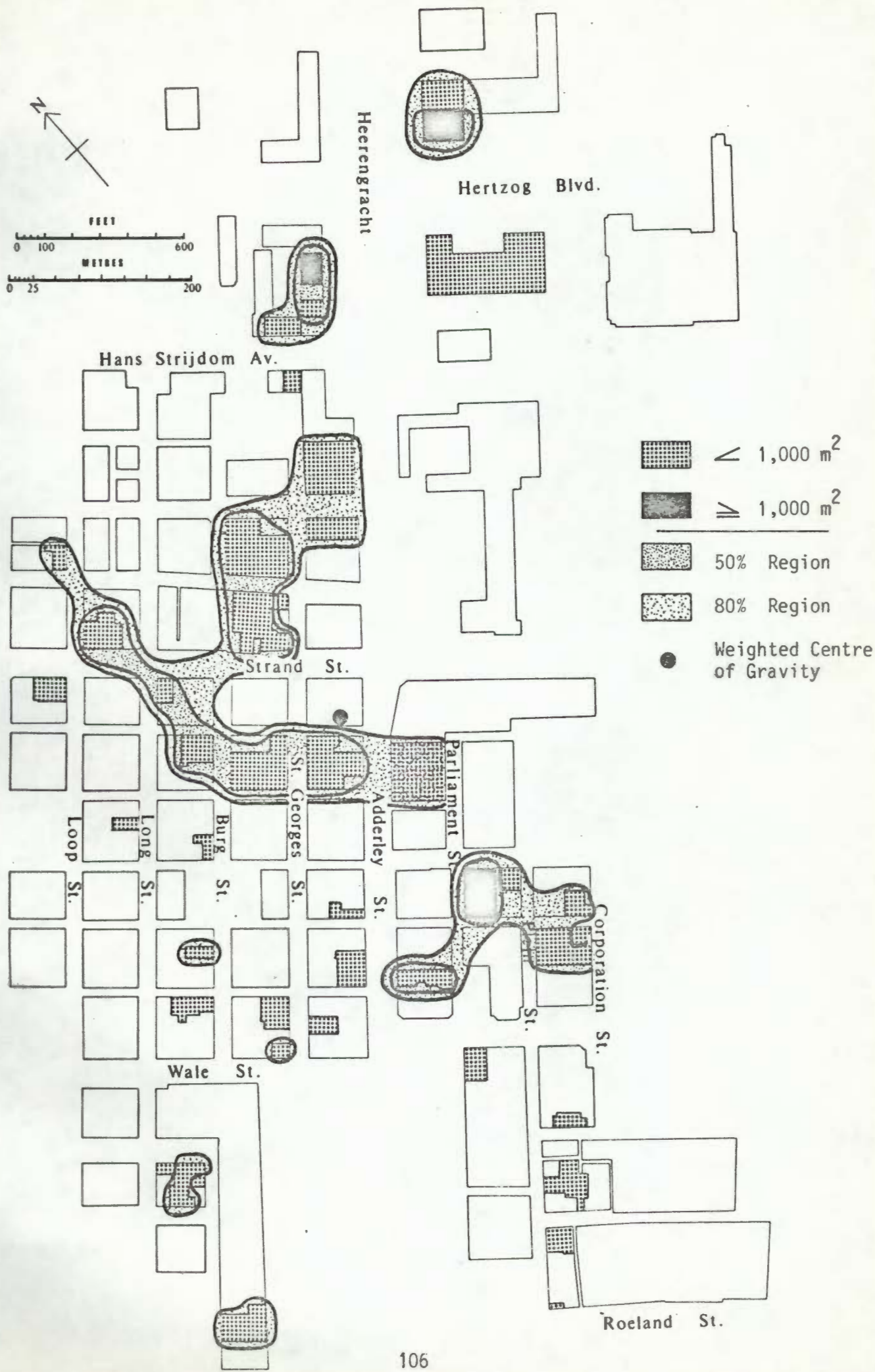


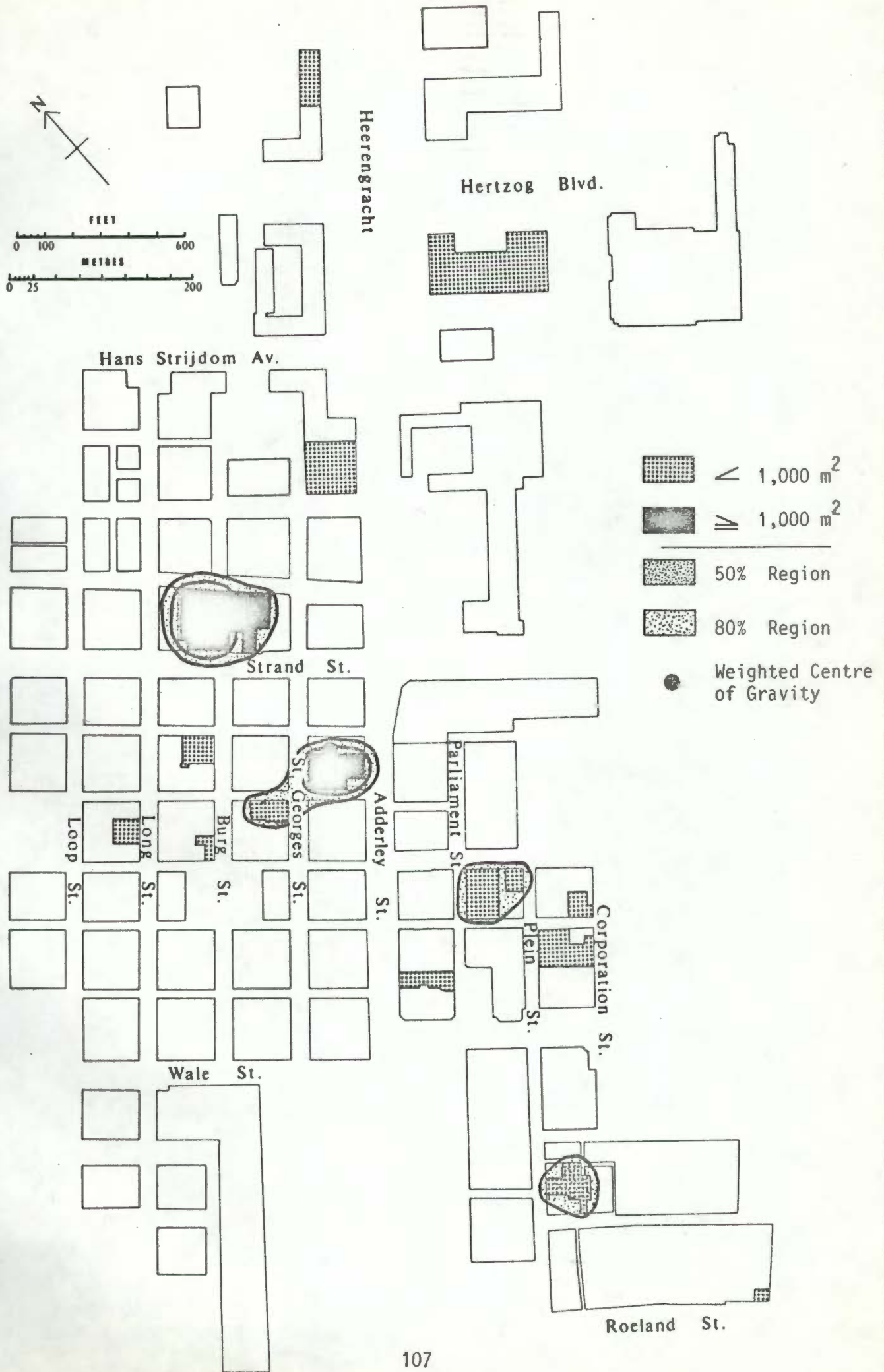






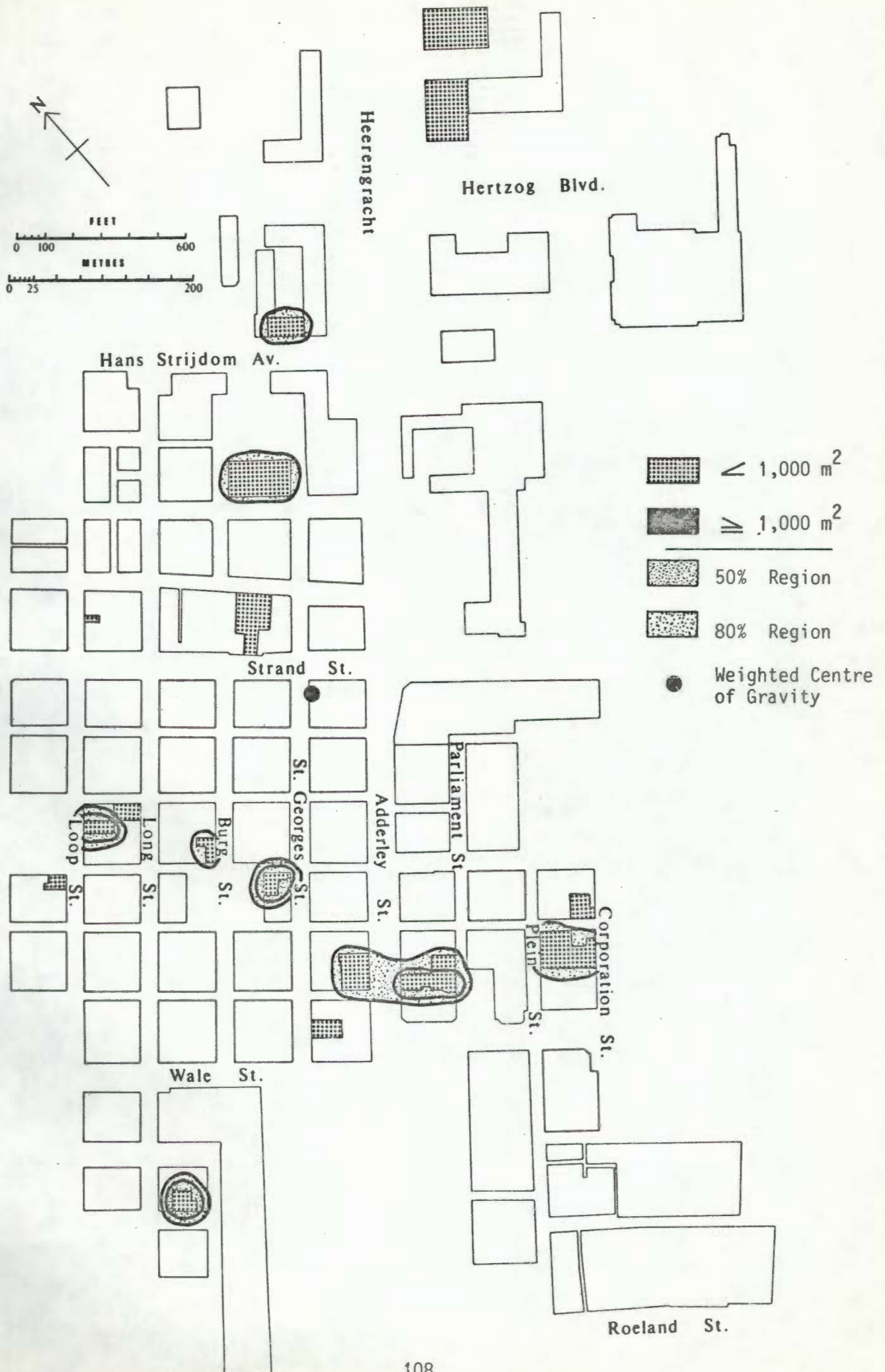


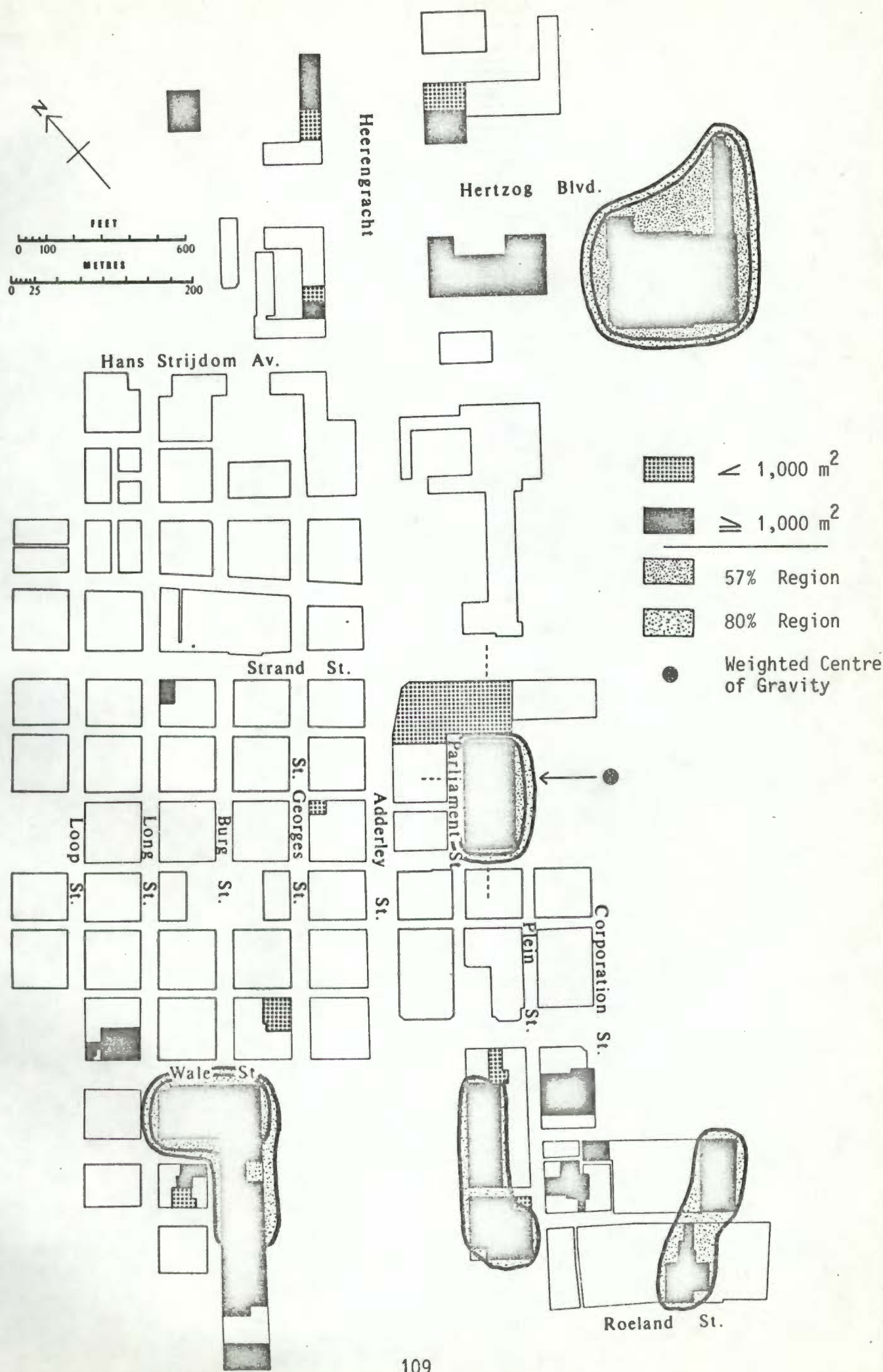


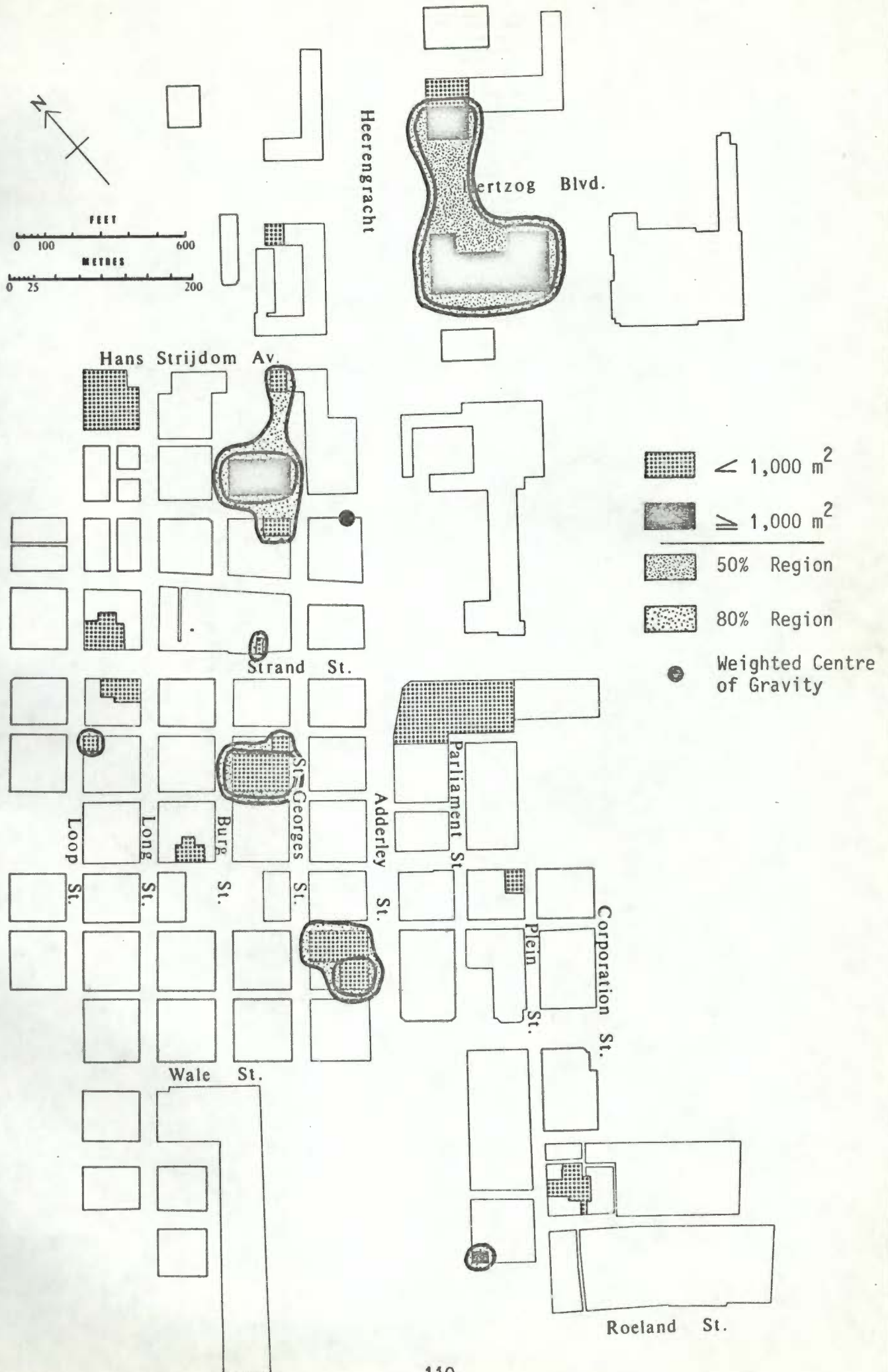


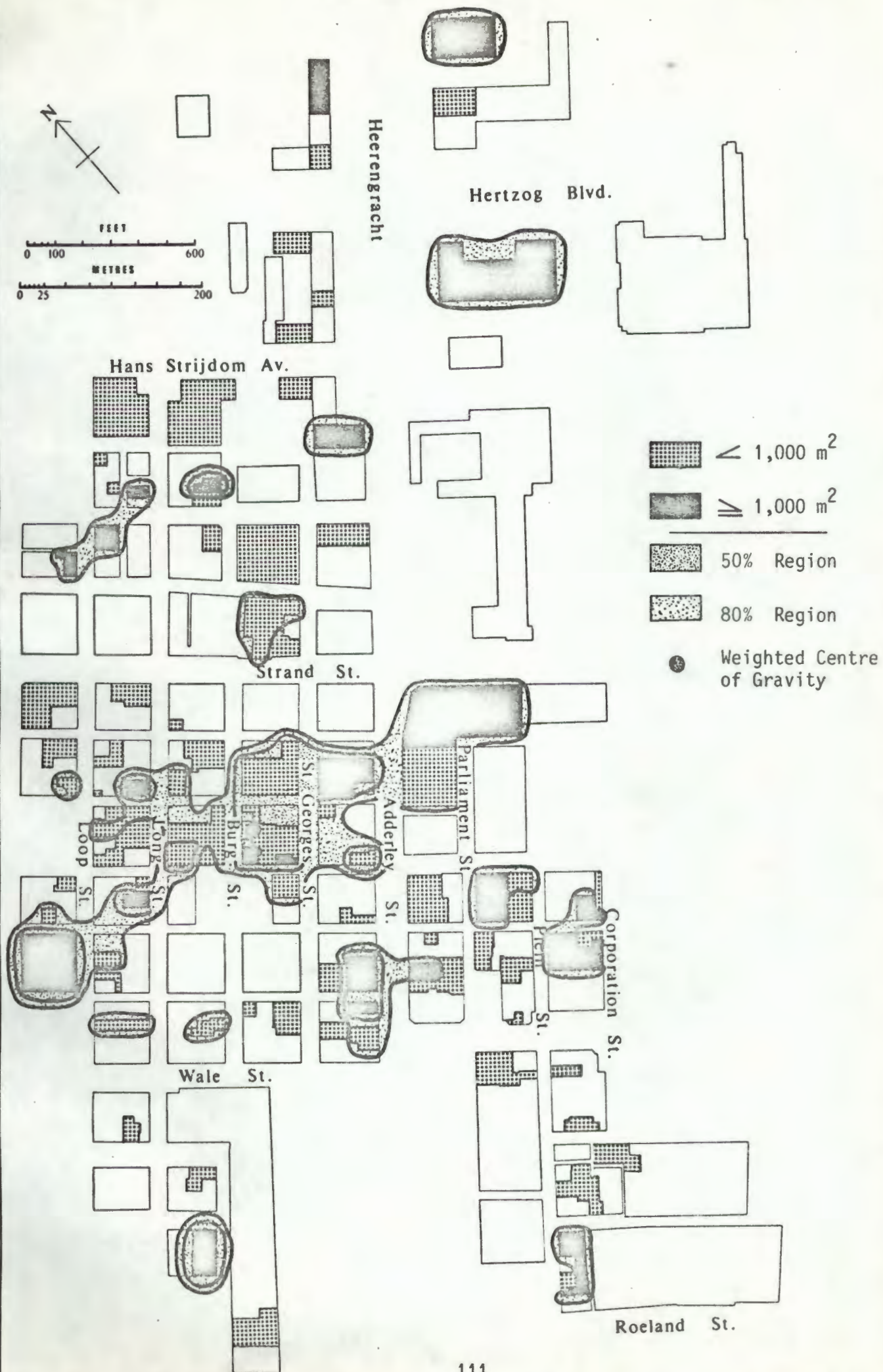
CHARITIES

FIGURE 5.31









the 50 per cent core of the distribution is strongly clustered, although the whole distribution is only moderately clustered with respect to all offices.

CONCLUSIONS

It is clear that most office functions in the CBD exhibit locational patterns that are indicative of distinct clustering in particular parts of the CBD. Moreover, various of the locational patterns show distinct similarities. One example is that the Medical Profession, Computer Services, Food Companies, Oil Companies, Shipping Companies and Freight Services are land uses that are concentrated on the Foreshore. On the other hand Medical Services, Film & Entertainment and Architects tend to locate in the western periphery. In a further example Banks, Building Societies, Insurance Companies, Other Financial, Clothing, Domestic Services, Lawyers and Retail Offices are concentrated mainly in the old city in the vicinity of the Retail Core, while Estate Agents & Developers, Insurance Brokers, Business Services, Advertising Agencies and Accountants are all clustered in the Redevelopment Zone between Hans Strijdom Avenue and Castle Street.

The apparent groupings of office land uses do not follow the sectoral divisions given in Table 4.1 and which have been used in previous CBD land use studies. Thus, for example, the six Financial Office land uses do not form a locational group. Groups of land uses with common locational patterns tend to comprise

office land uses drawn from a variety of sectors in most instances.

The following section seeks to determine the degree to which common locational patterns exist. The objective is to condense a large number of individual land use patterns into a few general patterns of overlapping land uses. The common land use patterns thus identified should assist in interpreting the structure of the CBD and facilitate the development of a spatial model of office organization in central Cape Town. A variety of techniques are available for grouping data, including statistical Cluster Analysis and Factor Analysis. Factor Analysis has been adopted for use in the present study as it has a decisive advantage, in that in addition to grouping similar variables, the results permit the locational pattern of each group to be mapped. The technique has also been used successfully in previous land use studies, such as by Goddard (1968) and Edgington (1982).

FACTOR ANALYSIS

"Factor analysis is a means by which the regularity and order in phenomena can be discerned" (Rummel, 1968, p445). The technique seeks to define the patterns of common variation in a data matrix by identifying a small number of uncorrelated significant Factors. Variation that is unique to particular variables is ignored.

In brief, Factor Analysis takes variables which have been scaled

to have a mean of zero and unit variance and represents each variable by means of a vector in the common Factor space. The correlation between any two variables is given by the cosine of the angle between the vectors. For Varimax rotation a system of orthogonal axes are imposed on the configuration of vectors, with the component loadings of the variables on each Factor being the co-ordinates of each vector on the axes. In order to simplify the pattern of Factor loadings rotation is applied to the axes. The axes are rotated so that each variable loads at it's maximum on one Factor and at a minimum on the other Factors, in so far as this is possible. It may be assumed that Factor Analysis is today a technique used in common practice and it is inappropriate, therefore, to discuss the mechanics of the procedure in detail here. In applying the technique in the present work reference was made to the work of Cattell (1978), Johnston (1977), King (1969), Rummel (1967) and Stopher and Meyburg (1979).

The data used for the analysis was that collected during the land use survey described in Chapter 4, namely the floor areas occupied by the various land uses in the buildings of the CBD. The data were aggregated to give totals for each city block; the conventional unit of analysis in land use studies. The use of city blocks was necessary since most, if not all, individual buildings contained a limited variety of land uses. Were individual buildings to be used as the statistical units, the data matrix for a building by building analysis would contain a high proportion of zero entries. The result would be low

communalities between variables and hence an unsatisfactory Factor Analysis. Though the problem remained it was greatly reduced through the use of city blocks as statistical units.

The data matrix comprised floor areas for 44 land uses (both office and non-office) in the 74 blocks that comprised the CBD. Block number 56 (Figure 3.1) was excluded from the analysis since the floor area of the S.A. Transport Services administration building was not known. Factor Analysis assumes that the data array for each variable is normally distributed. An examination of the arrays of land use data showed that they approximated an exponential distribution. To meet this contingency the data was transformed logarithmically before it was further transformed to standard scores (mean of zero and variance of one). Zero entries were given a nominal value of one, and thus assumed a logarithmic value of zero ($\log 0$ (base 10) does not exist).

Table 5.3 shows that a total of 14 Factors with eigenvalues greater than one were identified. These Factors accounted for 75.9 per cent of the total variance. The frequent occurrence of zero entries in the original data matrix resulted in the generation of the relatively large number of Factors.

Table 5.4 shows the sorted rotated Factor loadings for the first six Factors. Only Factor loadings with an absolute magnitude greater than 0.3 are shown. The remaining eight Factors with eigenvalues greater than one were characterised by loadings greater than 0.5 on only a single variable. Those Factors were

TABLE 5.3

EIGENVALUES AND PROPORTION OF VARIANCE EXPLAINED

FACTOR	EIGENVALUE	CUMULATIVE VARIANCE
1	10.726	24.38 %
2	4.069	33.63 %
3	2.543	39.41 %
4	2.062	44.09 %
5	1.898	48.40 %
6	1.734	52.35 %
7	1.608	56.00 %
8	1.482	59.37 %
9	1.415	62.58 %
10	1.331	65.61 %
11	1.227	68.40 %
12	1.160	71.04 %
13	1.114	73.57 %
14	1.021	75.89 %

The remaining 30 Factors accounted for 24.11% of the total variance.

TABLE 5.4

SORTED ROTATED FACTOR LOADINGS

FACTOR 1	LOADING	FACTOR 4	LOADING
Medical	0.716	Publishing	0.780
Other Finance	0.698	Charities	0.678
Insurance	0.682	Film/Entertainment	0.469
Accountants	0.678	Professional Bodies	0.459
Engineers	0.640	Medical Suppliers	0.388
Lawyers	0.637	Building Societies	0.342
Shops	0.572	Architects	0.314
Imp/Export Agents	0.566		
Estate Agents	0.561	FACTOR 5	
Personal Services	0.498	Airlines	0.817
Diplomatic	0.477	Building Societies	0.592
Vacancy	0.473	Freight Services	0.363
Business Services	0.465	Film/Entertainment	0.356
Insurance Brokers	0.455	Architects	0.346
Banks	0.431	Parking	0.314
Professional Bodies	0.412		
Building Societies	0.401	FACTOR 6	
Commercial/Industrial	0.372	Government	0.775
Architects	0.339	Parking	0.337
		Banks	0.310
FACTOR 2		Diplomatic	0.302
Shipping Companies	0.869	Vacancy	-0.305
Food Companies	0.827	Personal Services	-0.326
Freight Forwarders	0.761	Architects	-0.472
Oil & Petrochemical	0.715		
Computer Services	0.682		
Advertising Agencies	0.542	Factor loadings with an	
Commercial/Industrial	0.541	absolute magnitude of less	
Business Services	0.446	than 0.300 are not shown.	
Insurance Brokers	0.407		
Accountants	0.386	Land uses have loadings of	
Estate Agents	0.354	greater than or equal to	
Parking	0.349	0.5 on only one Factor.	
Banks	0.307		
Diplomatic	0.301		
FACTOR 3			
Educational	0.820		
Retail Offices	0.745		
Clothing	0.564		
Imp/Export Agents	0.463		
Medical Suppliers	0.413		
Personal Services	0.370		
Professional Bodies	0.338		

considered to be less significant in the present analysis, representing effectively land uses exhibiting a unique locational pattern. Factor 1 loads principally on professional, retailing and financial land uses, as well as Vacancy, Personal and Business Services and Agents. Factor 2 loads strongly on transport land uses, Food and Oil Companies, Computer Services, Advertising Agencies and the offices of Commercial & Industrial Companies. In addition the Factor loads on Business Services, Insurance Brokers, Accountants, Estate Agents and Parking. Factor 3 loads principally on the Education, Retail in Office Space, and Clothing office land uses. To a lesser degree the Factor loads on Import/Export Agents, Medical Suppliers, Personal Services and Professional Bodies. Factor 4 loads mainly on the Publishing, Charitable and Professional Body office land uses. There are lesser loadings on Film & Entertainment, Medical Suppliers, Building Societies and Architects. Factor 5 loads strongly on Building Societies and Airlines and to a lesser extent on Freight Services, Film & Entertainment, Architects and Parking, and Factor 6 loads strongly on the Government sector. Factor 6 has lesser loadings on Parking, Banks and Diplomatic offices, with negative loadings on Vacancy, Personal Services and Architects.

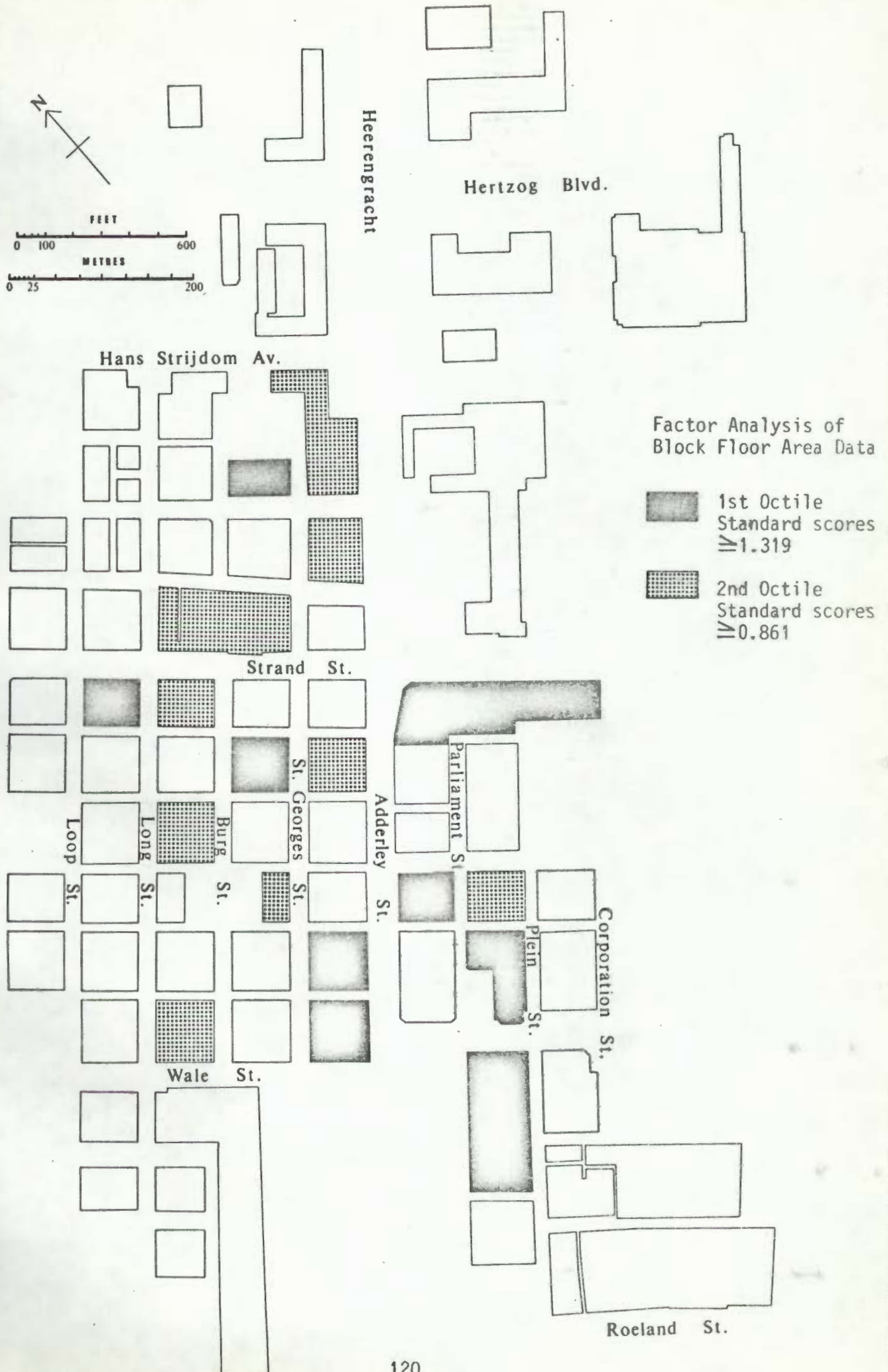
The standardised Factor scores for each city block on each of the six Factors were mapped and the results are shown in Figures 5.35 to 5.40. It bears observation that because of a limitation of the technique the results achieved by the Factor Analysis do not provide an unambiguous basis of interpretation. In the present

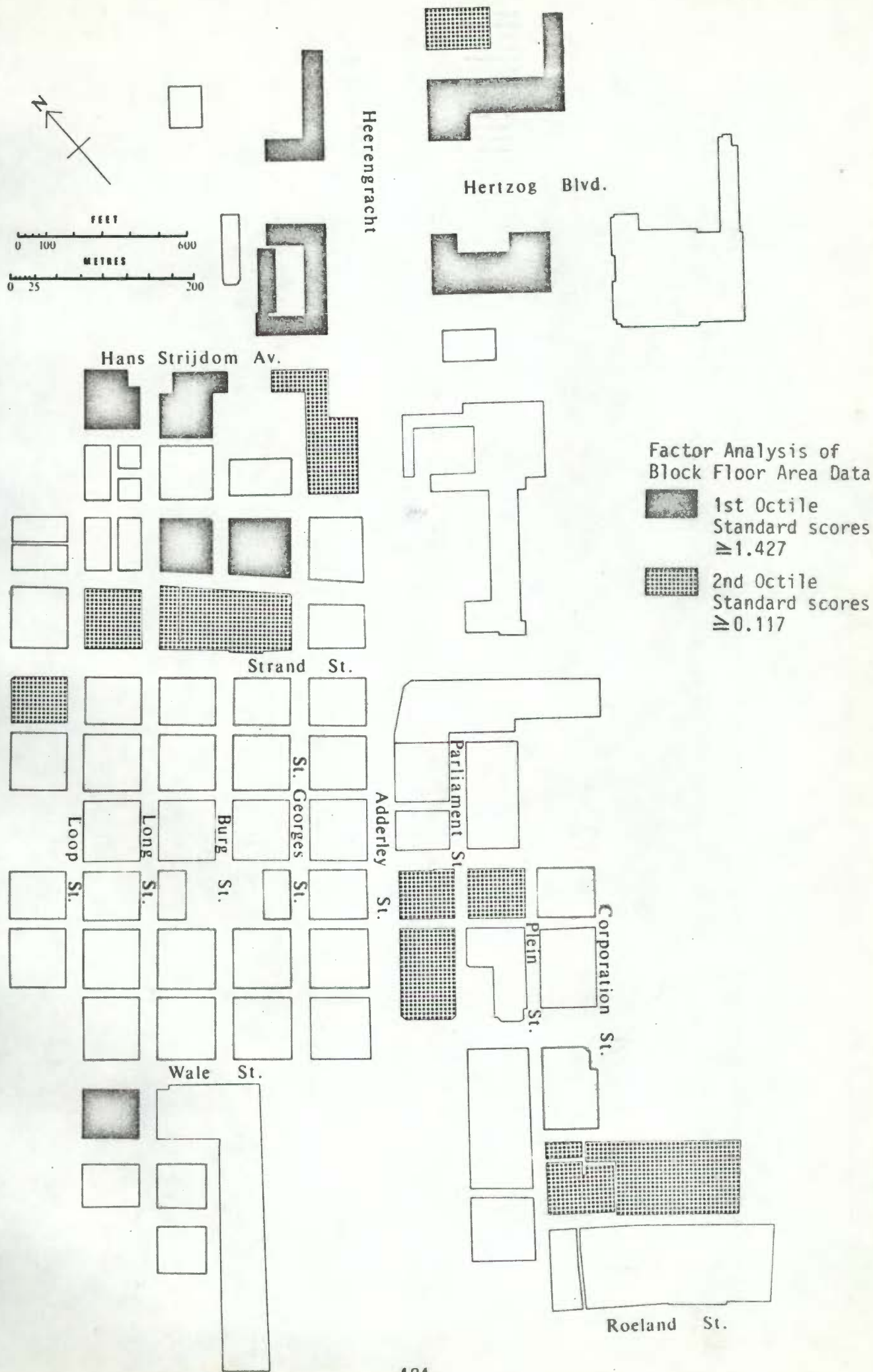
study the technique groups only those land uses which usually occur in the same city blocks. It does not, for example, allow for the possibility that land uses may generally locate in the same area but not in precisely the same blocks. The only instance where this problem of interpretation arose seriously, however, was the case of the Medical category. It will be recalled that the majority of Doctors are located on the Foreshore (Figure 5.12). The land use category, however, does not load significantly on Factor 2 which represents land uses concentrated on the Foreshore, as shown by Figure 5.36. On the contrary the land use loads on Factor 1 because it occurs in almost all the blocks which score highly on this Factor, but is found on the Foreshore in only two significant concentrations.

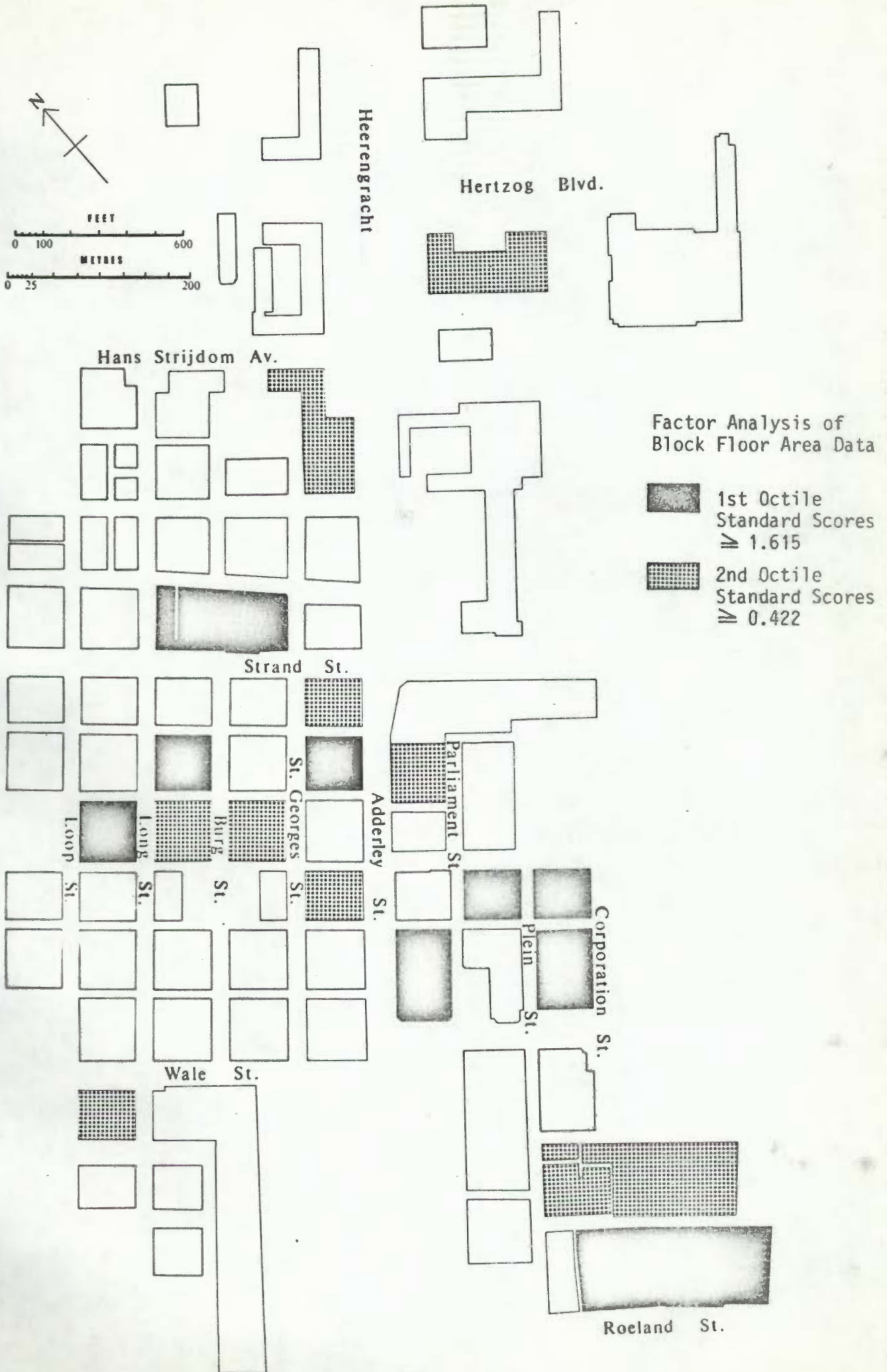
DESCRIPTION OF FACTOR PATTERNS

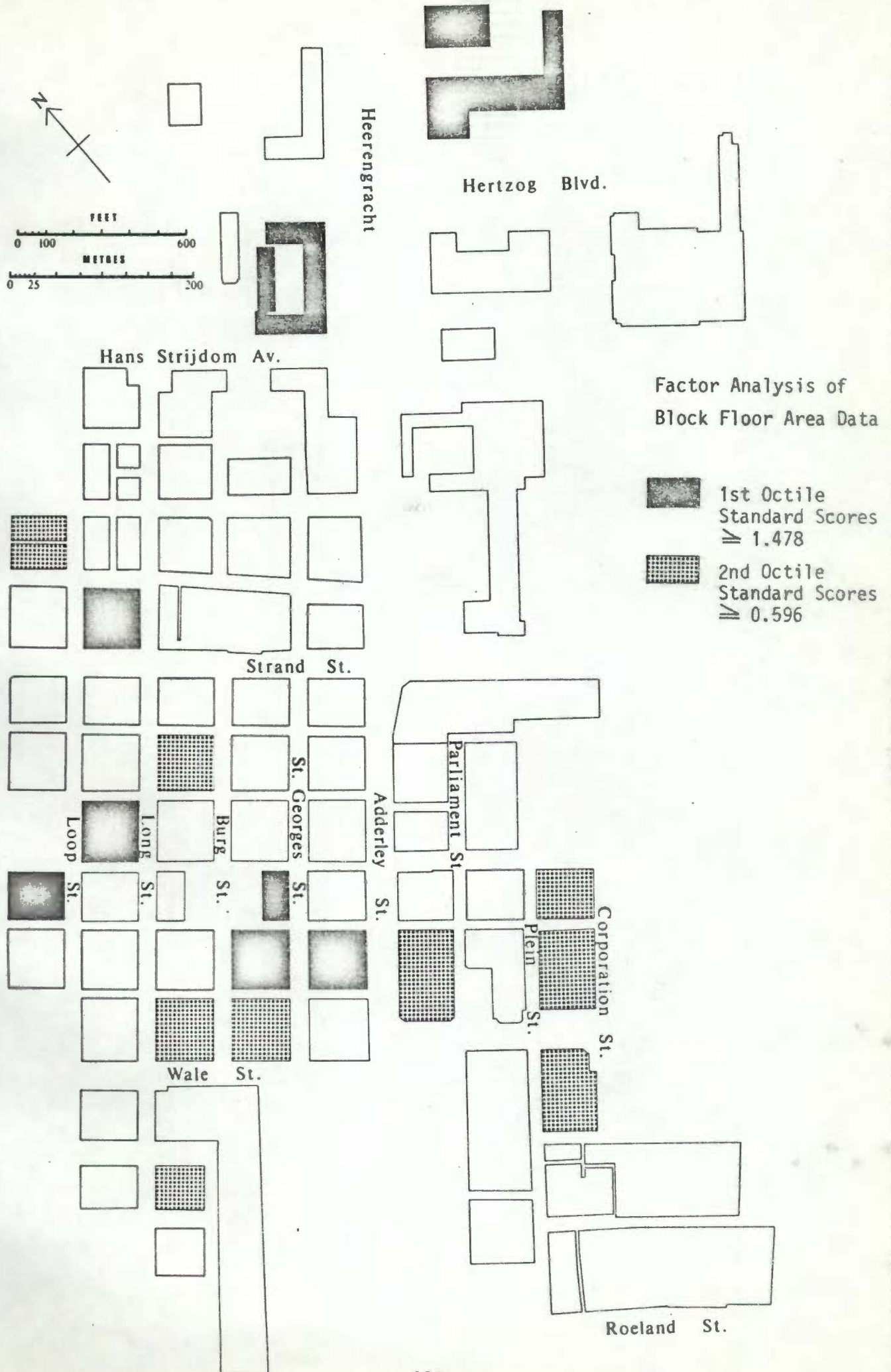
The first and second octiles of the standard scores for each city block on Factor 1 are shown in Figure 5.35. The Factor represents land uses which are concentrated in the old city. Certain blocks lie within the Retail Core, but the majority lie just outside that area. Almost without exception Foreshore blocks do not fall in either the first or second octile, as is the case for the peripheral areas of the CBD west of Long Street and south of Wale Street.

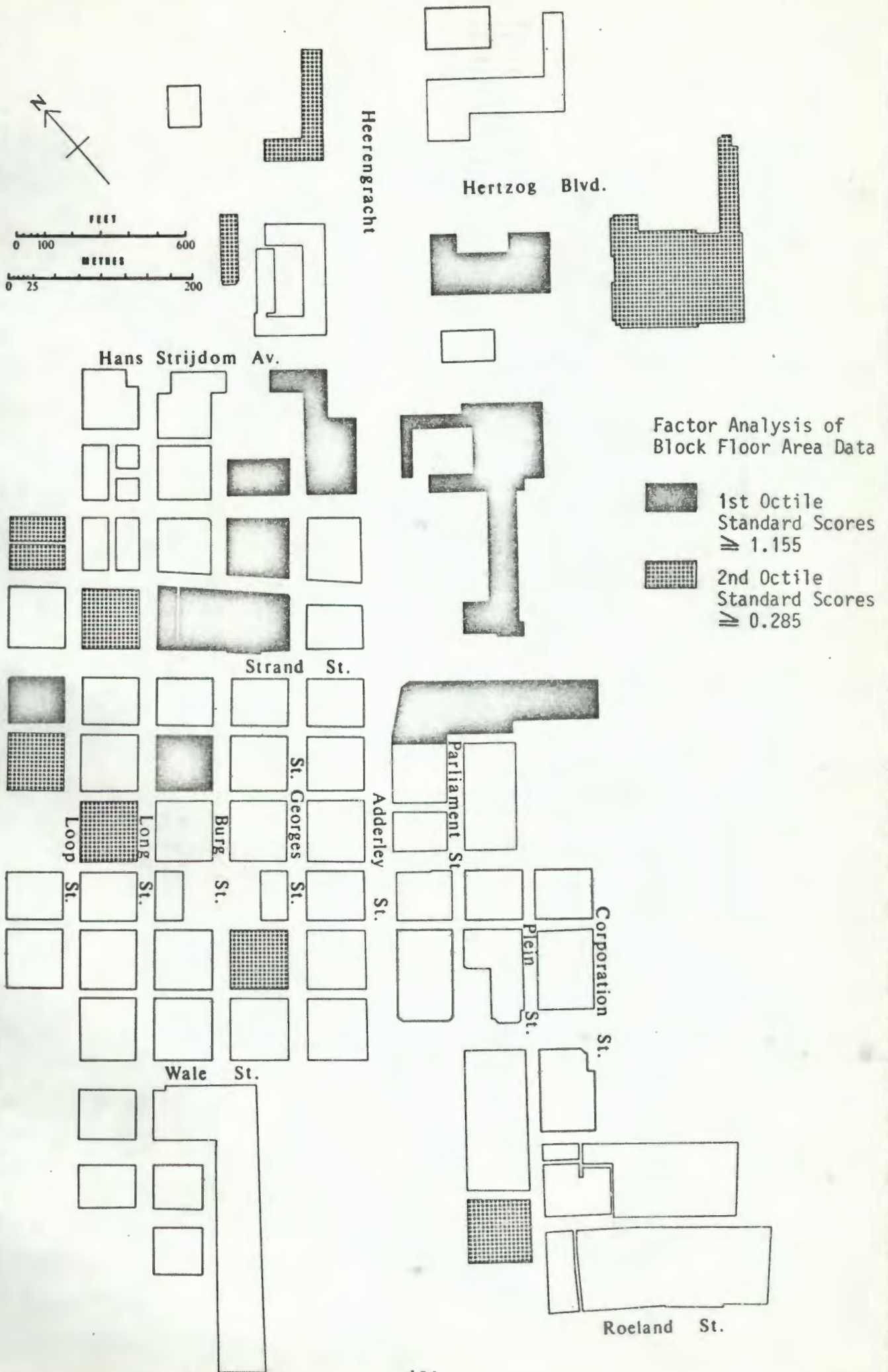
The pattern for Factor 2 is shown in Figure 5.36. This Factor represents land uses which are concentrated on the Foreshore and also in the Redvelopment Zone between Castle Street and Hans

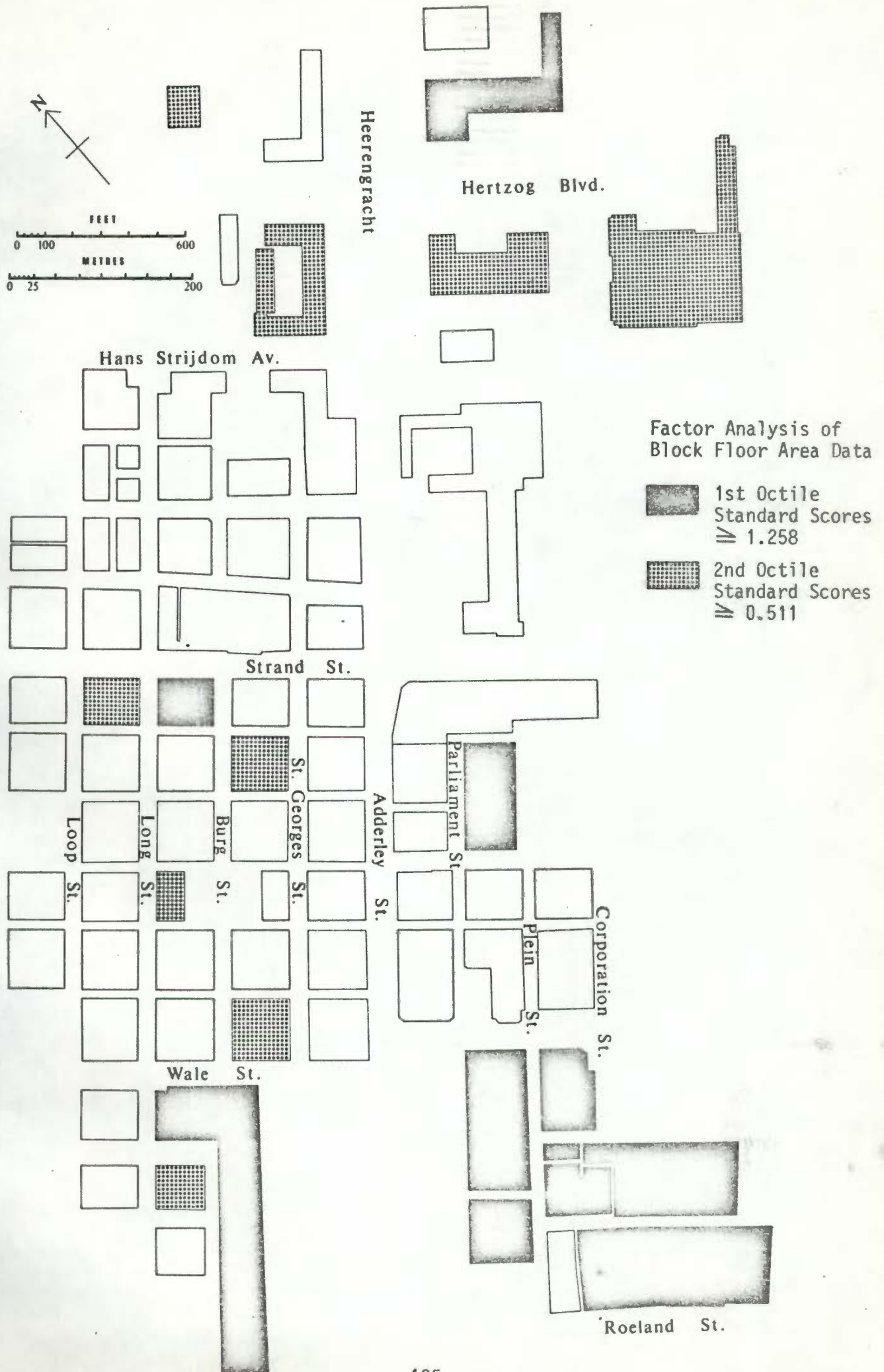












Strijdom Avenue. The land use group almost totally avoids the area south of Strand Street, the only notable exception being a block on Wale Street in which the IBM building is located.

The location pattern for Factor 3 is shown in Figure 5.37. The land use group is concentrated both in and near the Retail Core. The land use group is largely absent from both the Foreshore and the Redevelopment Zone, with only four blocks north of Castle Street falling in the top two octiles. The pattern differs from that of Factor 1 in that different city blocks are identified although these are located in the same general area. There is also a concentration of blocks in lower Plein Street and in the eastern peripheral area in the vicinity of Roeland Street.

The pattern for Factor 4 is shown in Figure 5.38. This land use group is almost completely absent from the Retail Core, and also the Redevelopment Zone. There are concentrations of blocks in the more northerly (distant) parts of the Foreshore, in the western periphery of the CBD and in a belt running across the CBD between the Retail Core and Wale/Spin Streets. Although discontinuous, the pattern resembles a crescent.

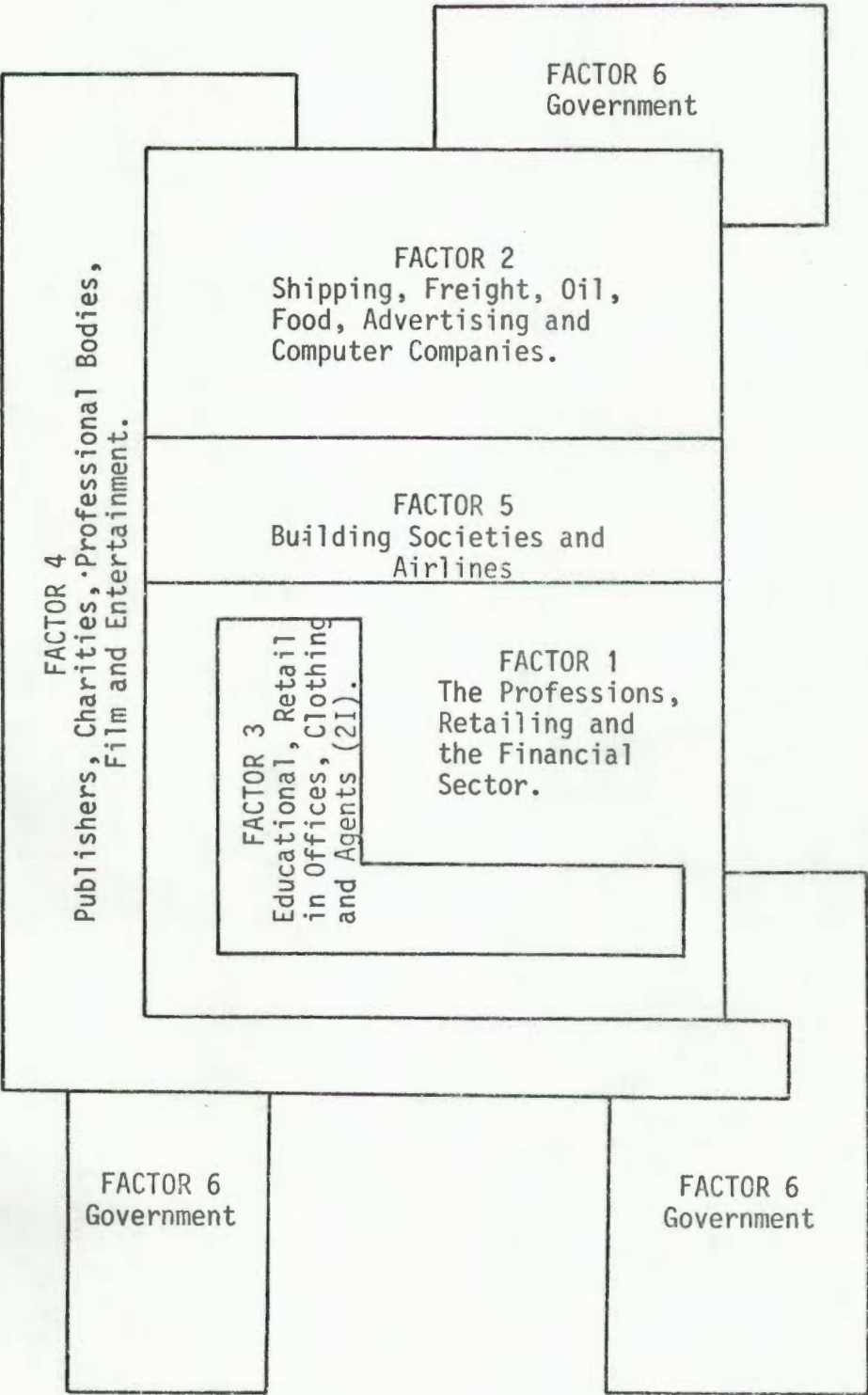
Figure 5.39 shows the distribution pattern for Factor 5. This land use group tended to be heavily concentrated in the Redevelopment Zone between Castle Street and Hans Strijdom Avenue. A lesser concentration occurred on the Foreshore and in the blocks surrounding the western portion of Strand Street. The

land use group is largely absent from the Retail Core and the CBD south of Shortmarket Street.

The pattern for Factor 6 is shown in Figure 5.40. There are three main concentrations, namely to the west of the Public Gardens, in the blocks adjacent to upper Plein Street, and to a lesser extent on the Foreshore. All three concentrations are in peripheral areas of the CBD. The land use group is almost absent from the Redevelopment Zone and the Retail Core.

A MODEL OF INTRA-CBD LOCATION OF LAND USE GROUPS

The location patterns generated by the six Factors have been idealised in Figure 5.41. The shapes depicted in the figure are not exact, but depict the essential elements of the distributions within the generalised shape of the CBD. It is clear that Factors 1, 2, 3 and 5 represent land uses occupying the more central parts of the CBD, although not necessarily the Retail Core. Factor 1, representing professional, financial and retailing land uses, as well as Vacancy, Personal and Business Services and Import/Export Agents, is concentrated in and around the Retail Core in the old city. In the same area, but concentrated in different city blocks, is the land use group represented by Factor 3. This group comprises Educational, Retail and Clothing Company offices, as well as Import/Export Agents, Medical Suppliers, Personal Services and Professional Bodies. The Factor 2 land use group, comprising Industrial Company offices, Shipping, Freight, Oil and Food Companies, Advertising Agencies,



Computer Services, Business Services and Parking, among the more important, is concentrated in the northern part of the CBD on the Foreshore and in the Redevelopment Zone. The land use group is located north of the Retail Core for the most part. Factor 5, a group comprising Airlines, Building Societies, Freight Services, Film & Entertainment, Architects and Parking, is located between the Factor 1 and 2 groups largely in the Redevelopment Zone.

Around these four land use groups is located the group represented by Factor 4. The group forms a peripheral belt around the CBD, except on the eastern side. The group comprises Publishers, Charities, Film & Entertainment offices, Professional Bodies, Medical Suppliers, Building Societies and Architects. Also peripherally located is the Factor 6 land use group. This group represents mainly Government offices, but also includes Banks, Diplomatic offices and Parking, and forms three separate peripheral nuclei. It is a noteworthy feature of the model that the peripheral land use groups represented by Factors 4 and 6 are absent from the eastern border of the CBD. This reflects the effects of the barriers to CBD expansion that exist in this area, and which were discussed in Chapter 2.

CONCLUSION

It is apparent that most individual office land uses are considerably more clustered than are all offices, and that the clusters have their own distinct locational patterns within the

CBD. The Factor Analysis demonstrated that there are similarities between the locational patterns of groups of individual land uses. Six significant land use groupings were identified which included the majority of land uses present in the CBD. The land use groupings identified did not follow a conventional sectoral land use classification , viz Financial, Services, Transport, and others, but comprised an assortment of varied land uses. Two questions arise from these findings. Is the grouping of land uses generated by functional linkages between the land uses, or does the grouping of land uses arise from common locational requirements, irrespective of whether or not functional linkages exist?

The following chapter will examine these questions during the course of attempting to explain both the individual land use location patterns and the locational patterns of the land use groups identified in the model. Attention is focussed on identifying the relative importance for the various land uses of a variety of possible locational forces.

CHAPTER 6

TOWARD AN INTERPRETATION OF LAND USE PATTERNS

In the previous chapter individual office land use patterns were identified and described. Six groups of land uses exhibiting common locational characteristics were identified by means of a Factor Analysis, and formed the basis of an idealised model of functional zones (land use groups or Factors) in central Cape Town (Figure 5.41). The object of this chapter is to interpret and explain the pattern of location of the six functional zones, and to examine location patterns of individual office land uses where these depart from the pattern of the functional group of which they form a component. Interpretation and explanation is achieved through the use of data drawn from the questionnaire survey.

NOTES ON THE QUESTIONNAIRE DATA

Tables 6.1, 6.2 and 6.3 display data for individual office land uses drawn from the questionnaire survey. Table 6.1 provides data on the basic characteristics of each office land use, such as the average rental paid and the average net area occupied by establishments. The values stated in the table are sample means. An exception to the rule is the case of data relating to the 'main form of contact with clients'. The data in this case are expressed by integers 1, 2 or 3, where the numbers indicate the modal class. Thus the number 2 for category 1A (Insurance Companies), for example, indicates that more establishments in

the category relied on visits by their staff to clients to attract business, than on visits by clients or on non face-to-face means of contact.

Table 6.2 depicts the network of face-to-face contact linkages that connect office establishments in Cape Town. The data were derived from the responses to question 30 of the questionnaire (Appendix 2). The table gives the percentage of the sample which had face-to-face contact with establishments of a particular land use category on at least a weekly basis. Only the five strongest linkages are shown for each office land use, except in cases where a tie occurred. In such instances linkages have been recorded as either less than or more than five instances depending upon the particular circumstances. As a further refinement of the data, instances of linkages where less than 20 per cent of the sample had at least weekly contact with establishments of a particular land use are omitted from the table. Such linkages were insufficiently strong to have a noticeable effect on locational patterns.

Table 6.3 illustrates the responses to question 23 of the questionnaire (Appendix 2). Establishments were asked to indicate the type (if any) of organizations with which they had very frequent face-to-face contact, and which required a location within no more than approximately five minutes walk from such organizations. Only those functions which were listed by 20 per cent or more of each office land use sample are given.

Tables 6.4 through 6.7 contain data derived from the questionnaire, but which has been aggregated by functional group (Factor). Table 6.4 gives statistics for each functional group (Factor) and was derived from Table 6.1. The data are expressed in the form of weighted averages of the means for each component land use with a loading of greater than 0.3 on the particular Factor (see Table 5.4). The exception is the data relating to the 'main form of contact with clients' which is expressed as the proportion of the component land uses which ranked each method of contact as of primary importance. Thus 38 per cent of the 17 office land uses loading on Factor 1 considered visits by clients to be their most important method of contact.

Table 6.5 contains Spearmans Rank Correlation co-efficients which express the relationship between average rentals and standard scores for each Factor by city block. Average rentals for 50 of the 75 city blocks comprising the CBD were calculated from responses to questions 15 and 16 of the questionnaire (Appendix 2).¹ The spatial pattern produced by these rental data is illustrated in Figure 6.1.

Table 6.6 is derived from Table 6.2. The table indicates the proportion which intra-functional group linkages comprise of the total linkages for each functional group (Factor). To ensure the identification of major linkage patterns Table 6.6 uses only data

¹ Rental data for the remaining 25 city blocks was not available. This was due either to the block being owner occupied, or the the absence of a response from firms occupying the block.

for land uses with loadings of greater than or equal to 0.5 on the Factor concerned. The table thus indicates, for example, that 30 per cent of the linkages originating in eight office land uses with loadings of greater than 0.5 on Factor 1 were with firms classified in the same land use group.

Finally, Table 6.7 shows the relative importance of the five hypothesised location determinants identified in Chapter 1. The suggested locational determinants were accessibility to clients, accessibility to staff needs, accessibility to services, appearance of premises and rental. In question 34 of the questionnaire (Appendix 2) organizations were requested to rank the five locational determinants in descending order of importance. The table is derived from the average rankings given to each locational determinant by each land use, as contained in Table 6.1. Row A indicates the percentage of the component land uses of each Factor (loading greater than 0.3) which ranked each determinant as of prime importance. Row B shows the percentage of each Factor's component land uses which ranked each determinant as of either primary or secondary importance. Thus 44 per cent of the Factor 1 land use group ranked accessibility to customers as their most important locational consideration, while 65 per cent ranked it as of either primary or secondary importance.

Individual office land uses were classified as either high order, intermediate or low order on the basis of their respective rent paying characteristics given in Table 6.1. High order land uses

were defined as those which were able to afford rentals in excess of R 7.00 per square metre and were prepared to pay in excess of R 9.50 per square metre for an ideal location. Intermediate order land uses were defined as those paying rentals of between R 5.00 and R 6.99 psm and prepared to pay between approximately R 8.00 and R 9.49 psm for an ideal location. Low order land uses were defined as those paying less than R 4.99 psm in rental, and prepared to pay no more than approximately R 7.99 psm for an ideal location.

In terms of conventional bid rent theory (see, for example, Alonso (1965)) CBD land uses bid for location about a single rental peak, which has been assumed in most CBD studies to be represented by the Peak Land Value Intersection. In the bid rent model land uses which bid high for location (high order land uses) predominate in the vicinity of the rental peak of the CBD. Intermediate and low order land uses, on the other hand, might be expected to generate successive zones toward the periphery of the CBD. In reality the distribution of rentals in the CBD is more complex than is suggested by the unifocal bid rent model, as is shown by Figure 6.1. At a detailed level predictions of land use distribution patterns are likely to be complex.

By averaging the location of the rental peak in Cape Town it was found that the mean rental peak in Cape Town is approximately coincident with the Peak Land Value Intersection (Figure 6.1). Average rentals in the city centre tend to decline with increasing distance from the PLVI, although at varying rates and

CHARACTERISTICS OF OFFICE LAND USES

MAIN FORM OF CONTACT WITH CLIENTS:

- 1 Visits by customers to the firms offices.
- 2 Visits by staff to the customers.
- 3 Non face-to-face contact (letters and telephone).

TABLE 6.2

THE STRONGEST LINKAGES BETWEEN LAND USES

LAND USE	1A	1B	1C	1D	1E	1F	2A	2B	2C	2D	2E	2F	2G	2H	2I	2K	2L	2M	2N	2O	3A	3C	3D	3E	3F	4A	4B	4C	4D	5A	6A	6B
1A	55	95	45	70																												
1B	79																															
1C	90	52			33								38	38																		
1D	100	100	66		66								66	66																		
1E	88	69																														
1F	90	35	50	65									35																			40
2A	81																															
2B	100																															
2C	64																															
2D	100																															
2E	93																															
2F	90	40	50																													
2G	57	24																														
2H	80	33																														
2I	84																															
2K	65																															
2L	73																															
2M	78																															
2N	69																															
2O	100																															
3A	75																															
3B	100																															
3C	61																															
3D	29	100																														
3E	60																															
3F	100																															
4A	75																															
4B	100																															
4C	NO DATA AVAILABLE FOR THIS CATEGORY																															
4D	90																															
5A	82																															
5B	33	100																														
5C	80																															
5D	58																															
6A	60																															
6B	NO DATA AVAILABLE FOR THIS CATEGORY																															
6C	57																															

The data are given in the form of the percentage of the sample having at least weekly contact with a particular office land use.

Only the five strongest linkages are shown, except in the case of a tie when the number closest to five are shown.

Linkages where less than 20 per cent of the sample had weekly contact are not shown.

TABLE 6.3

LAND USES WHICH ESTABLISHMENTS REQUIRED TO BE WITHIN FIVE MINUTES WALK

LAND USE	1A	1B	1C	1D	1E	1F	2A	2B	2C	2D	2E	2F	2G	2H	2I	2K	2L	2M	2N	2O	3A	3C	3D	3E	3F	4A	4B	4C	4D	5A	6A	6B
1A																																
1B																																
1C																																
1D		48	30																													
1E		40	40				40	20				20																				
1F							20																									
2A																																
2B																																
2C																																
2D																																
2E																																
2F		45					27				38		33																			
2G																																
2H																																
2I																																
2K																																
2L																																
2M																																
2N																																
2O																																
3A		40					20															20										
3B																																
3C																																
3D		29																					29									
3E																																
3F																																
4A																																
4B																																
4C																																
4D																																
5A																																
5B																																
5C																																
5D																																
6A																																
6B																																
6C																																

36 per cent with the harbour.

The data are given as the percentage of the sample who wished to be within five minutes walk of the particular land use.

own.

TABLE 6.4

FACTOR CHARACTERISTICS DERIVED FROM THE QUESTIONNAIRE

	FACTOR 1	FACTOR 2	FACTOR 3	FACTOR 4	FACTOR 5	FACTOR 6
PERCENTAGE TENNANTS*	92%	95%	97%	94%	96%	85%
AVERAGE* RENT PAID	R 8.10	R 8.13	R 5.26	R 5.99	R 7.10	R10.98
AVERAGE* NET FLOOR AREA	377	418	207	345	434	3,533
AVERAGE* STAFF	17.5	22.4	10.1	22.3	11.4	115
MAXIMUM* RENT WILL PAY FOR IDEAL SITE	R 9.68	R10.86	R 7.71	R 9.38	R11.17	R17.57
PERCENTAGE WITH OWN PARKING*	41%	48%	16%	27%	31%	50%
CONSIDER CBD SITE ESSENTIAL*	51%	52%	47%	42%	52%	60%
MAIN FORM OF CLIENT CONTACT:						
VISIT BY CLIENT.	38%	19%	57%	36%	30%	83%
VISIT TO CLIENT.	50%	58%	29%	50%	30%	13%
NON FACE-TO-FACE.	12%	23%	14%	14%	40%	0%

* These statistics are the weighted averages. The sample means for the land uses listed for each factor in Table 6.2 were multiplied by the number of organizations in the land use, the results totalled and divided by the total number of firms.

The statistics for the main form of client contact give the proportions of component land uses rating each method most important.

TABLE 6.5

CORRELATION ANALYSIS OF RENT AND FACTOR LOCATION PATTERN

Factor 1

Spearman's Rank Correlation Co-efficient +0.311 (df 48)
This correlation is significant at the 97.5 per cent level.

Factor 2

Spearman's Rank Correlation Co-efficient +0.085 (df 48)
There is no significant correlation.

Factor 3

Spearman's Rank Correlation Co-efficient -0.332 (df 48)
This correlation is significant at the 99 per cent level.

Factor 4

Spearman's Rank Correlation Co-efficient -0.029 (df 48)
There is no significant correlation.

Factors 5 and 6

Spearman's Rank Correlation Co-efficient +0.288 (df 48)
This correlation is significant at the 97.5 per cent level.

TABLE 6.6

INTERNAL LINKAGE STRUCTURE OF FACTORS

	PROPORTION OF TOTAL LINKAGES WITHIN THE GROUP
FACTOR 1	30 %
FACTOR 2	41 %
FACTOR 3	NONE
FACTOR 4	20 %
FACTOR 5	18 %
FACTOR 6	20 %

The table is derived from Table 6.2 which shows the five main linkages for each land use. To avoid overlap, only the linkages for the 'key' land uses of each factor were used. Key land uses are those with a Factor loading of greater than or equal to 0.5. (Each land use has a loading of greater than or equal to 0.5 on only one Factor.)

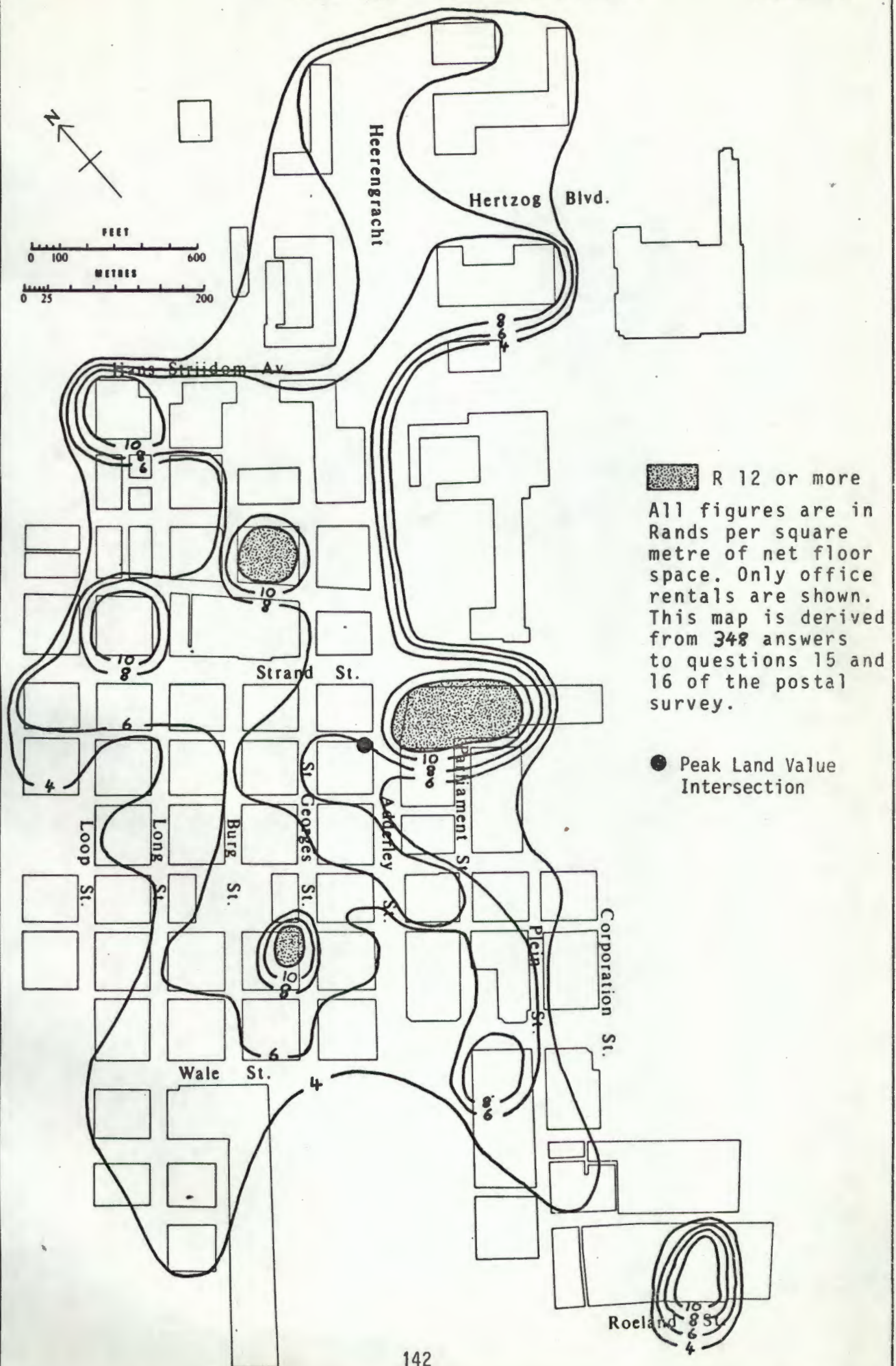
TABLE 6.7

RANKING OF HYPOTHESED LOCATION DETERMINANTS

		LOCATION DETERMINANTS				
		ACCESSIBLE TO CLIENTS	ACCESSIBLE TO SERVICES	RENT	ACCESSIBLE TO STAFF NEEDS	APPEAR- ANCE OF PREMISES
FACTOR 1	A	44 %	35 %	12 %	0 %	9 %
	B	65 %	47 %	56 %	18 %	15 %
FACTOR 2	A	35 %	31 %	15 %	0 %	19 %
	B	39 %	46 %	58 %	38 %	19 %
FACTOR 3	A	29 %	14 %	43 %	14 %	0 %
	B	71 %	14 %	86 %	29 %	0 %
FACTOR 4	A	36 %	36 %	29 %	0 %	0 %
	B	50 %	64 %	57 %	14 %	14 %
FACTOR 5	A	50 %	50 %	0 %	0 %	0 %
	B	50 %	70 %	50 %	0 %	30 %
FACTOR 6	A	50 %	0 %	0 %	0 %	50 %
	B	67 %	67 %	16 %	0 %	50 %

The table is derived from an analysis of the average rankings of the importance of the five location determinants for each land use category.

- A The percentage of land uses with loadings of greater than 0.3 which ranked each determinant as their most important consideration when choosing an office location.
- B The percentage of land uses with loadings of greater than 0.3 which ranked each determinant as either their first or second most important consideration when choosing an office location.



not without significant departures from a smooth distance decay gradient. Using the mean rental peak and the distribution of rental values in the Cape Town CBD it is possible to test the general validity of the bid rent concept as an explanation of the distribution of office land uses of different orders in the CBD.

AN EXPLANATION OF DISTRIBUTION PATTERNS

Functional groups (Factors) 1, 2 and 5 paid average rentals of R 8.10, R 8.13 and R 7.10 respectively, and are thus composed of generally high order land uses. Figure 5.41 shows that these land use groups (Factors) are centrally located, and thus comprise the core of the CBD. The general distribution patterns thus accord with the predictions of bid rent theory. It is a significant feature, though, that the rental peak is asymmetrically located with respect to the high order core formed by these land use groups. The distribution of high order land uses about the peak is axially elongated toward the Foreshore. The axis of elongation is formed by the main street of the CBD, namely Adderley Street. The fact that three centrally located functional zones (Factors) were identified by the Factor Analysis suggests that the component land uses differ in their locational requirements in some respect other than on the basis of rent. The detail of the spatial variations are discussed in later paragraphs.

FUNCTIONAL LAND USE GROUP 1 (FACTOR 1)
(The Professions, Retailers and the Financial Sector)

It will be recalled from Figure 5.35 that the Factor 1 land use group is concentrated primarily in or near the Retail Core in the old city, rather than in the Redevelopment Zone and Foreshore areas. Centrality in location arose primarily from a need for high accessibility to clients. Thus 44 per cent of respondents ranked accessibility to clients as their primary locational consideration (65 per cent ranked it either first or second). Of the component land uses of the group, 38 per cent indicated their reliance on visits by customers as their main form of contact.

An examination of the office land uses comprising the group suggests that their clients are primarily the public, rather than other businesses. The Retail Core area location is preferred as a location since it is there that pedestrian volumes are highest and contact with the public most convenient. It is significant in this regard that Factor 1 was the only land use group on which retailing activities (as opposed to Retail Offices) loaded significantly.

INDIVIDUAL PATTERNS OF COMPONENT LAND USES (FACTOR 1)

The distribution pattern of the Insurance land use was depicted in Figure 5.2. Both the pattern and its interpretation parallel that for the Factor as a whole. The division of the pattern into two clusters may be explained by characteristics which are not

apparent from the tables. The southern cluster contained several very large head offices. These were located in old owner occupied premises in the former financial district, as identified by Davies (1965). The northern cluster contained mainly smaller regional offices in rented premises, and which have thus been able to move more readily in response to redevelopment trends in the CBD.

The distribution of Banks was illustrated in Figure 5.3. This land use also parallels the pattern and interpretation identified for the Factor as a whole. It should be noted, though, that the premises which were located within the 80 per cent inclusion boundary were principally large regional offices of Banks. These institutions require access to the population of the city as a whole, and customarily occupy prestigious premises. The occurrences located outside the boundary were almost entirely local branch offices which have different locational requirements.

The distribution of Other Financial offices was shown in Figure 5.4. Although the locational pattern parallels that of the Factor as a whole, the characteristics of the land use are somewhat different. It is a high order land use (Rental R 7.10) but business is conducted primarily by non face-to-face means. Respondents ranked customer accessibility as of secondary importance after accessibility to services. The concentration within the former financial district may be ascribed to a high order rent paying ability, moderate requirements for good appearance of the premises (ranked third), and a relatively high

proportion (17 per cent) of owner occupiers. Such owner occupiers include the two largest establishments, which have historical locations within the former financial district. Significant linkages existed with Banks, with establishments of the same genera, and with Lawyers, Accountants, and Business Services. The location pattern of Other Financial offices, however, only corresponds closely to that of Lawyers, and to a lesser extent Banks.

The location pattern for the Insurance Broker land use was depicted in Figure 5.6. As may be expected given the moderate 0.455 loading of this land use on Factor 1, it's location pattern and characteristics differ somewhat from those of the Factor as a whole. It was of an intermediate order (rental R 6.58) and ranked rental levels before customer accessibility as it's major locational determinant. It is probable that a relatively high proportion of business conducted by brokers originated from other firms, rather than from the public. A concentration in the Redevelopment Zone area may be explained by the availability of a large proportion of the rented premises in the CBD in that area on the one hand (100 per cent of brokers rented their premises). On the other, the area enjoys a near central location within the CBD with good access to high order establishments and to the public. It should be noted that a strong functional linkage with Insurance Companies appears to have had little influence at the intra-CBD level.

The distribution pattern for Estate Agents and Developers was illustrated in Figure 5.7. The distribution exhibits a greater degree of concentration in the Redevelopment Zone than is the case for Factor 1 as a whole. The concentration may be ascribed to an expressed need for access to services and for reasonable rental premises. Convenience of access to customers was ranked third as a locational determinant. At least in certain cases Estate Agents/Developers were located in buildings for which they were the letting agents or the original developers. That association has naturally led to some concentration of the land use in the Redevelopment Zone. Linkages existed with Banks, Building Societies, other Estate Agents, Lawyers, Business Services, and Local Government. Only Building Societies and Business Services, however, exhibited similar locational patterns.

The locational pattern for Lawyers was illustrated in Figure 5.8. The land use quite closely follows the distribution pattern for the Factor as a whole, but it displays distinctive characteristics. The land use is of an intermediate order (R 5.84) and respondents ranked customer accessibility second after access to services as a locational determinant. The distribution pattern of the land use may be explained in terms of a combination of a need for accessibility to clients, and a requirement to be within about five minutes walk of the courts (located on Queen Victoria Street and in the vicinity of Caledon Square). That explains why few Lawyers are located north of Strand Street.

The distribution pattern for Engineers and Quantity Surveyors was illustrated in Figure 5.10. The pattern exhibits a greater tendency toward a Foreshore location than is the case for Factor 1 as a whole. There is no clear indication from the data as to why this should be so, but various factors may be considered. Firstly, 100 per cent of the establishments rented their premises, and are thus excluded from a large number of blocks near the Retail Core. Secondly, 73 per cent of establishments had a strong linkage with construction firms, of which the largest example in Cape Town is located on Hertzog Boulevard. Finally, the impression gained during the land use survey was that these establishments required modern and generally prestigious premises, a fact not revealed by the questionnaire data. The majority of the CBD's modern buildings occur north of Castle Street (see Figure 7.7).

The distribution pattern for Personal Services was depicted in Figure 5.11. The locational pattern closely parallels that for the Factor as a whole, although the characteristics of the land use differ somewhat from the average. Personal Service establishments have an intermediate rent paying ability, but a strong requirement for good access to the public. A Retail Core location, although generally not in the most expensive premises, is thus a natural outcome.

The Medical land use distribution pattern was illustrated in Figure 5.12. The pattern is to a large extent atypical of the distribution pattern for the Factor 1 land use group for reasons

already covered in Chapter 5. Although accessibility to clients is ranked first as a locational determinant, and clients visits are the main form of contact, these establishments generally did not choose a Retail Core area location. On the contrary, a very high proportion of the space occupied by these establishments (64 per cent) was concentrated in custom built medical centres located on the Foreshore. Buildings housing medical centres provide for specialist infrastructural needs and require to be large to facilitate strong within group linkages (71 per cent). They require sites of significant size, and accessible to patients. Sites available on the Foreshore meet these requirements.

The locational pattern for Accountants was illustrated in Figure 5.13. Accountants display a greater tendency toward a concentration in the Redevelopment Zone, than land uses of Factor 1 as a whole. The distribution pattern may be ascribed to the moderate importance attached to customer accessibility (ranked third), and the fact that the majority of customers are other businesses, rather than the public. Although the land use is classed in terms of the data as being of only intermediate rent paying ability (average R 5.70), field surveys have shown that the majority of Accountants occupy high rental buildings (see Figure 6.1). A sampling error may explain the discrepancy. Accountants show significant linkages with Banks, Other Finance offices, Building Societies, Lawyers, Business Services and Government, but only correspond in their distribution to Business

Services.

The location pattern for Business Services was shown in Figure 5.14. This land use also displays a concentration in the Redevelopment Zone, and thus differs from the distribution pattern of the Factor as a whole. The distribution may again be ascribed to a combination of factors, the most important of which are that clients are largely other businesses, that 95 per cent of establishments rented their premises, and that the land use is one of high order status.

The location pattern for the Import/Export and Manufacturers Agents land use was given in Figure 5.15. Both the pattern and the interpretation are somewhat different to that for Factor 1 as a whole. This is a low order land use (rental R 4.42) and one which ranked customer accessibility second after rental as a locational determinant. Thus the land use is located in areas generally peripheral to but near the Retail Core, and produces a distribution that approximated a ring. Linkages with other office activity within the CBD were generally weak.

The pattern for the Diplomatic land use was illustrated in Figure 5.33. There is no clear pattern evident for this land use. Locational requirements stated by respondents were prestigious premises and access to the public. Those requirements were combined with a moderate linkage with National Government.

FUNCTIONAL LAND USE GROUP 2 (FACTOR 2)
(Shipping, Freight, Oil, Food, Advertising, and Computer Co's)

It will be recalled from Figure 5.36 that this land use group exhibited a concentration on the Foreshore and in the Redevelopment Zone. The component land uses generally did not require locations in the vicinity of the Retail Core due to the relative unimportance of customer (public) accessibility. Only 19 per cent of component land uses relied on visits by clients for the conduct of their business, 35 per cent ranked customer accessibility as of prime locational importance and 39 per cent ranked it as of either primary or secondary. The Foreshore location is encouraged by the fact that 19 per cent of land uses ranked prestige/appearance as of prime locational concern (most modern buildings are located north of Castle Street). In addition, the strong linkages of many of these land uses with either the docks, SA Transport Services or customs, and the high degree of linkage within the group (41 per cent) were significant factors.

INDIVIDUAL PATTERNS OF THE COMPONENT LAND USES (FACTOR 2)

The location pattern for the Computer Services land use was depicted in Figure 5.16. Both the pattern and explanation are similar to that for the Factor as a whole. Despite the fact that customer accessibility was ranked first, clients are mainly other businesses, so that this does not require a Retail Core location.

The location pattern for the Advertising category was shown in Figure 5.17. The position is similar to that for Computer Services as although customer accessibility was ranked first, clients largely comprise other businesses. Although not reflected by the questionnaire data, the majority of establishments were located in prestigious modern rented premises, and were thus largely restricted to the area north of Castle Street. A proportion were located in restored historic buildings (thus also prestigious) and these account for the scattered distribution throughout the periphery. Linkages with land uses such as Film and Entertainment offices (47 per cent) have produced little correspondence in the locational pattern.

The distribution for the Oil and Petrochemical category was shown in Figure 5.22. This land use was distinctive in that prestige/appearance was ranked of prime importance, so that it is not surprising to find it concentrated almost exclusively in the largest and most modern buildings. There were also linkages with Banks, Lawyers, Medical Practitioners, Shipping Companies and Freight Services, of which the last four are concentrated in close proximity. It should be noted that the intermediate order status given to this land use must be considered misleading. It appeared that these establishments paid significantly less per unit area for premises in their respective buildings than did other tenants. This may be ascribed to the very large areas occupied and the probable long term nature of the leases.

The distribution pattern for the offices of Industrial Companies

was depicted in Figure 5.24. Customer accessibility was ranked as of primary locational importance, but again customers are generally other businesses. Further, most firms relied mainly on visits to their clients for the conduct of the business. It should be noted that the concentration south of Spin Street differed in character, in that these establishments were principally associated with nearby, or adjacent factories and were of a much lower order than those elsewhere.

The Food, Shipping and Freight Services distributions were illustrated in Figures 5.25, 5.26 and 5.27 respectively. The patterns are closely similar, none of the land uses ranked customer accessibility as of prime importance and all three required access to each other and the docks.

FUNCTIONAL LAND USE GROUP 5 (FACTOR 5) (Building Societies and Airlines)

As will be recalled from Figure 5.39 this land use group was concentrated primarily within two blocks of the railway station. The reasons for the locational pattern of this functional land use group being distinct from that for Factors 1 and 2 are unclear, but may include a trade off between the importance of customer accessibility, prestige, and a need to be near the air terminal in the case of airlines. It should be noted that the majority of second octile blocks in the distribution are concentrated in peripheral areas and reflect the locational requirements of the Film and Entertainment and Architectural land

uses. Both of these are intermediate order land uses.

INDIVIDUAL PATTERNS OF COMPONENT LAND USES (FACTOR 5)

The locational pattern of the Building Society land use was shown in Figure 5.5. This is a high order land use with a strong requirement for customer accessibility. It is not clear why the pattern differs from that, for example, of Banks which were identified as having similar requirements. It is suggested that the difference may be ascribed to the fact that many Building Societies do not own prestigious, old and monumental buildings of the type generally occupied by the large Banks, and are thus not so tied to locations in the former financial district.

The pattern for the Architectural land use was illustrated in Figure 5.18. It is an intermediate order land use with only a moderate requirement for customer accessibility. The pattern, however, reflects conflicting influences in that some establishments located in modern prestigious buildings, while others preferred renovated historic buildings.

The pattern for the Airline land use was illustrated in Figure 5.28. As has been suggested, these firms require good customer accessibility, but also have a strong linkage within the category, as well as with Business Services, Shipping Companies and Freight Services. It should be noted that premises for South African Airways and an airways terminal were incorporated in the development of the new station.

FUNCTIONAL LAND USE GROUP 4 (FACTOR 4)
(Publishers, Charities, Professional Bodies and Film)

As will be recalled from Figure 5.38 this land use group exhibited an approximately crescent shaped peripheral distribution in the CBD. The functional group thus also conforms to the pattern predicted by bid rent theory, given the low to intermediate order of all but one of the component land uses (average rental R 5.99). The group has a moderate need for customer accessibility (36 per cent rely mainly on clients visits, 36 per cent ranked customer accessibility of prime importance, 50 per cent either of primary or secondary importance). More important locational considerations were access to services and rental. Thus the land use group does not require a central location.

INDIVIDUAL PATTERNS OF THE COMPONENT LAND USES (FACTOR 4)

The distribution pattern for Publishing was depicted in Figure 5.9. Both clusters are relatively peripheral to the Retail Core, as predicted by the intermediate order of the land use. It should be noted that the concentration in upper St. Georges Street is focused on two newspaper owner occupiers located in this area for historical reasons.

The location pattern for the Film and Entertainment land use was shown in Figure 5.19. This is an intermediate order land use which ranked customer accessibility and access to services as

primary locational determinants. The land use does not, however, rely heavily on visits by the public. Thus a Retail Core location is not required. It will be observed from Figure 6.1 that the land use is concentrated in the vicinity of the R 6.00 per square metre isoval.

The location pattern of the Professional/Institutional Bodies land use was depicted in Figure 5.29. It is a low order land use for which customer accessibility was ranked fourth as a locational determinant. The land use, however, is widely distributed, ranging from the Retail Core to the western periphery, which reflects the highly diverse nature of the constituent establishments (establishments ranged from the prestige offices of the Institute of Chartered Accountants, to the low quality offices of the Angling Association).

The distribution pattern for Charities was illustrated in Figure 5.31. Although a low order land use, the pattern is distorted by the fact that many landlords granted greatly reduced rentals to such establishments, which allowed them to locate in areas where they would not normally be expected.

FUNCTIONAL GROUPS WHICH DIFFERED FROM EXPECTED PATTERNS

FUNCTIONAL LAND USE GROUP 3 (FACTOR 3)
(Educational, Retail Offices, Clothing and Agencies)

Figure 5.37 suggested that the distribution of this land use group was concentrated in and near the Retail Core, and

especially in lower Plein Street. The group thus enjoys a very central location notwithstanding low average rental payments (R 5.26), and a significant negative correlation between average rent and standard scores (Table 6.4). The land uses making up the group rely heavily on visits by clients for the conduct of their business. Thus 57 per cent and 71 per cent of respondents ranked customer accessibility as of either primary or joint primary and secondary importance respectively. A location in or around the Retail Core with high pedestrian flow volumes is clearly beneficial to these activities.

Low rental payments coupled with central locations occupied by land uses in the group appears to be contradictory. The availability of low rental premises in older less prestigious buildings located within the land use zone has created circumstances which permit the occupation of the functions in a relatively central location. The land uses are located in what may be termed low rental pockets in the otherwise high rental central area of the CBD. The older buildings concerned are considered as unattractive to higher order users who might otherwise occupy such space.

INDIVIDUAL PATTERNS OF THE COMPONENT LAND USES (FACTOR 3)

The distribution pattern for the Medical Suppliers land use was illustrated in Figure 5.20. This is an intermediate order land use. Respondents ranked access to customers as their primary locational consideration. Clients comprise the medical

profession, with the result that this is one of the few cases where linkages were observed to have a direct influence on locational patterns. A high proportion of establishments were located in the two Foreshore medical centres, while the remainder were more peripherally located, as is predicted for an intermediate order land use.

The distribution pattern for the Clothing offices land use was depicted in Figure 5.21. This is a low order land use, but one for which respondents ranked customer accessibility (the public) as of secondary locational importance after rental. The main concentration is thus in a group of poor quality mainly Victorian buildings located adjacent to Longmarket Street in the vicinity of the southern part of the Retail Core.

The distribution pattern for Retail Offices was illustrated in Figure 5.23. The majority of these offices are associated with nearby shops, or are themselves shops located in office space. The office section requires to be near the shops it is serving, while incurring the lowest possible rental. The shop portion was located in office premises presumably because it was unable to afford the rentals for ground floor shop premises, but it nonetheless required to be located in the Retail Core.

The distribution pattern for the Educational land use was given in Figure 5.30. This is a low order land use, but nonetheless one mainly relying on clients (students) visits, hence a choice of

location not more than about five minutes distant from the rail and bus stations.

FUNCTIONAL LAND USE GROUP 6 (FACTOR 6)
(Government Offices)

Land use group 6 is dominantly comprised of Government and to a lesser extent branch Bank and Diplomatic office land uses. The group has been categorised as a high order land use and on that basis may be expected to display a central location. In reality it occupies peripheral space distributed to the east and west of the Gardens and the northern perimeter of the Foreshore (Figure 5.40). The location of high rent paying land uses in the CBD periphery departs from the expectation of the bid rent model and requires explanation.

To a considerable degree the classification of the land use group as a high order group is misleading. The average office rental for the group was calculated as R 10.98 psm. The rental value is high and is unduly influenced by the Banking category. Given the fact that Government offices have over double the loading of any other component on Factor 6, it is probably more reasonable to use the average rental of Government offices of R 7.06 psm as being representative of the Factor. The rental value, however, still leads to a high order classification. A high proportion (31 per cent) of establishments within the group were owner occupiers, mainly government offices, and thus did not contribute to the determination of rental levels within the group. The space occupied by Government owned offices within the functional zone

was significant (in excess of 50,000 square metres in upper Plein Street alone). Nevertheless, a considerable proportion of Government, Banking and Diplomatic offices in the zone occupied rented premises. Such premises are frequently modern with high rental charges. It is rental charged for accomodation within these premises that determine the high rent levels within the zone. It is possible that modern buildings rented by the state were speculatively erected with a view to government occupation.

The location of state occupied premises east and west of the Gardens is largely explained by historical factors and by the location of Parliament. Government office space located on the Foreshore, on the other hand, is explained by shortages of such space in the traditional areas of location and the availability of rented space in new buildings erected on the Foreshore.

The Banking component of the land use group comprises smaller branch Banks serving local financial service needs. Banks in the land use group do not form part of the central cluster displayed in Figure 5.3.

CONCLUSION

It may be concluded that in broad terms the majority of office land uses and functional zones exhibit locational patterns which conform to the general predictions of conventional bid rent theory. There are, however, several significant departures.

Firstly, the centrally located high order land uses actually form three distinct functional zones, namely those represented by Factor 1, Factor 2 and Factor 5. The division arises due to the effects of locational considerations other than rental, including primarily the importance of client accessibility, linkages and to some extent prestige. Secondly, two of the functional zones identified did not conform to predicted location patterns. In the case of that represented by Factor 3, land uses were primarily low in order. A combination of irregularities in the rental pattern, arising from the presence of old low rental buildings in isolated locations in the vicinity of the Retail Core, and a strong requirement on the part of these land uses for good accessibility to the public resulted in a concentration near the Retail Core. In the case of Government offices, represented by Factor 6, the high order character of these land uses failed to result in the predicted central location. This was ascribed to a combination of a misleading average rental value, linkages to Parliament and other state departments, and historical patterns.

It should be borne in mind that the analysis only covers the office component of the CBD. Studies of the Frame of Cape Town undertaken by Davies (1965) and Dewar (1970) demonstrated that there was a surrounding zone of low order non-office land uses beyond the CBD boundary.

It must be concluded that linkages are of only moderate significance in explaining the locational patterns of office land uses at the intra-CBD level in Cape Town. Of the total number of linkages depicted in Table 6.2, 20.6% are with Banks, including a

large proportion of the strongest linkages. A further 14.7 per cent of linkages are with establishments in the same land use category, and 10 per cent with the Business Services category. Both Banks and Business Services are widely distributed through the CBD, so that linkages with these categories are unlikely to explain the location patterns of individual land uses. Similarly, linkages with other establishments in a land use might be expected to lead to the development of a land use cluster, but will not determine the location of that cluster. It is thus the remaining 54.7 per cent of the linkages illustrated in the table that may be expected to influence land use location patterns.

In the case of a number of office land uses linkages are an effective explanation of location patterns. Examples of such land uses include Lawyers, Oil Companies, Shipping Companies, Freight Services, and Food Companies. In other cases, however, where it was anticipated that linkages would have a clear effect, such as between Insurance Companies and Insurance Brokers or between Advertising Agencies and the Film and Entertainment land use, it was found that there was little correspondence in locational patterns at the intra-CBD level. A closer examination reveals that, almost without exception, cases where linkages were significant locational determinants involved a linkage with an eccentrically located land use. Examples include the courts in the southern periphery of the CBD, and the docks beyond the northern boundary. The finding suggests that the scale of the CBD

is insufficiently large for linkages to act as a major constraint on locational behaviour in the Cape Town CBD. This does not, however, imply that linkages are unimportant. At the macro level linkages are undoubtedly a major reason for establishments choosing CBD rather than decentralised locations.

In the present study it was found that three of the five hypothesised locational determinants were of primary significance in constraining locational choices in the CBD. These were requirements for accessibility to either corporate and/or general public clients, accessibility to services or linked activities and the level of rental that establishments were prepared to pay. Only in the case of Oil Companies and Diplomatic establishments was a requirement for prestige of major importance, while little importance was attached, almost universally, to locations which took into account staff convenience.

In Chapter 5 the question was posed as to whether the six functional zones derived from functional linkages between component land uses or from the influence of common locational requirements. The analysis has shown that only in the case of the land use group represented by Factor 2 (Shipping, Freight, Oil, Food, Advertising and Computer Companies located on the Foreshore) can it be said that common locational patterns arise to a significant degree from the effects of linkages. In the case of the remaining functional zones, common locational requirements are clearly the dominant influence.

CHAPTER 7

PROJECTIONS FOR THE FUTURE

This chapter returns to some of the themes of Chapter 2, including the impact of decentralisation, urban conservation and other considerations of significance. Detailed predictions for the short term future of the CBD over the next three to five year period will be made, and some more general predictions for the period to the year 2000.

THE CHANGING NATURE OF THE CENTRAL CITY

It is evident from the discussion in Chapter 2 that developments such as the Foreshore have resulted in considerable changes in the Central Business District. These will be discussed under the headings of Structural Change, relating to the location and scale of activities, and Compositional Change, relating to the proportions of the CBD occupied by various land uses.

STRUCTURAL CHANGE

Records of demolitions of buildings maintained by the City Council were used to estimate the 1970 Gross Construction Area (GCA). The area was calculated by deducting the GCA of buildings constructed since 1970 (see Figure 7.7) from the 1983 GCA total, and then adding back the GCA of buildings demolished during the period. The results of the estimation procedure are contained in Table 7.1. It was estimated that the GCA of the CBD amounted to

TABLE 7.1

GROSS CONSTRUCTION AREA PER CITY BLOCK

BLOCK	1970	1983	BLOCK	1970	1983
1	52,229	52,229	40	21,795	21,795
2	10,567	10,567	41	24,945	24,945
3	13,729	13,729	42	30,722	30,722
4	13,034	20,737	43	39,011	39,003
5	8,401	8,401	44	18,547	18,547
6	8,168	10,016	45	26,066	27,907
7	43,646	43,646	46	30,612	32,036
8	7,135	6,289	47	0	14,711
9	8,559	5,489	48	0	11,469
10	5,073	15,654	49	41,006	41,006
11	14,412	13,472	50	91,875	91,875
12	11,112	11,112	51	64,566	64,566
13	18,310	21,555	52	21,392	52,698
14	10,469	10,469	53	37,443	37,443
15	8,337	8,979	54	62,313	84,487
16	23,923	23,923	55	0	79,782
17	3,571	21,115	56	N/A	N/A
18	2,316	1,593	57	33,515	33,515
19	6,890	8,278	58	0	73,035
20	9,757	12,057	59	37,172	37,172
21	58,327	111,317	60	6,543	6,543
22	20,641	31,374	61	31,375	31,375
23	13,967	13,967	62	24,032	25,777
24	9,501	9,501	63	3,400	40,967
25	25,082	25,082	64	37,640	31,064
26	19,477	19,477	65	19,471	19,654
27	17,092	17,092	66	30,860	30,860
28	71,144	84,520	67	53,419	53,419
29	11,580	12,507	68	19,381	19,109
30	12,536	12,536	69	28,143	28,143
31	0	54,448	70	42,817	42,976
32	0	14,612	71	50,798	57,192
33	4,545	10,539	72	8,423	10,235
34	20,597	20,597	73	50,935	55,742
35	5,354	49,949	74	N/A	0
36	22,822	0	75	0	150,390
37	6,934	31,794			
38	16,732	16,732			
39	13,727	13,727	TOTALS	1,618,104	2,289,241

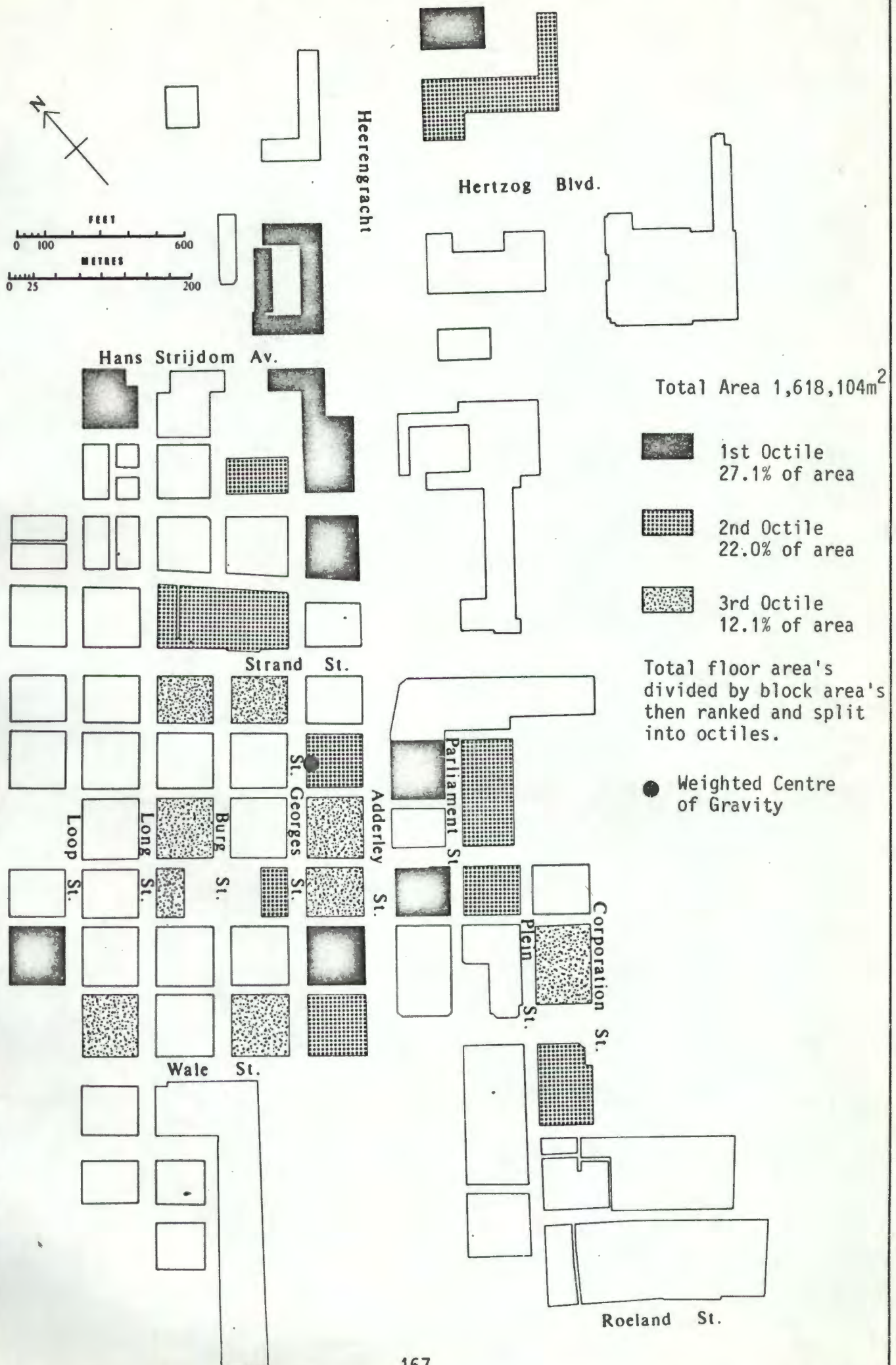
All figures represent Gross Construction Areas in square metres, thus vacant sites and construction sites are excluded.

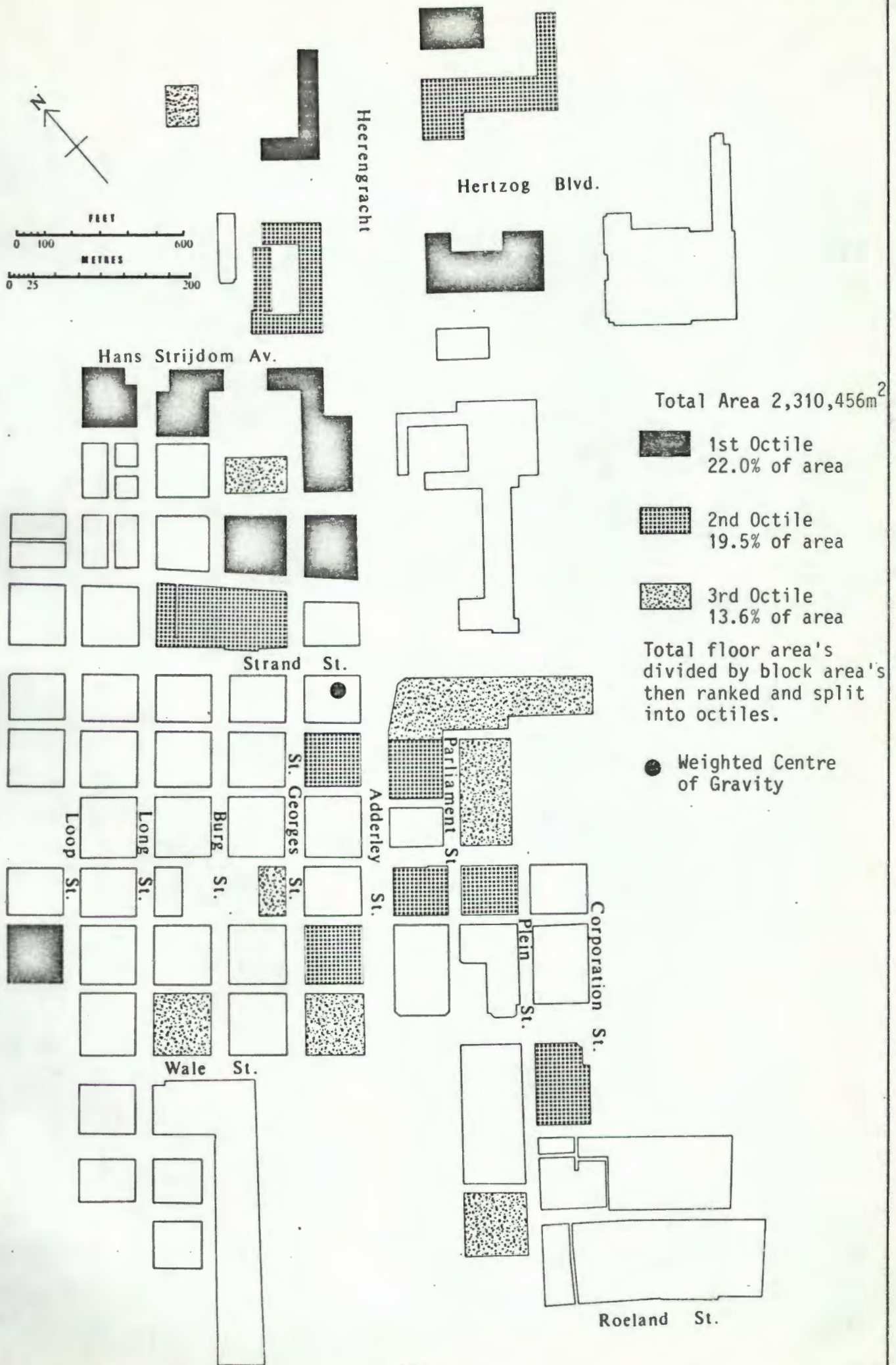
The 1970 data-is an estimate derived from the 1983 data with new buildings (opened since 1970) deducted and demolished buildings added back. Data on the areas formerly contained in buildings demolished since 1970 was obtained from the City Council.

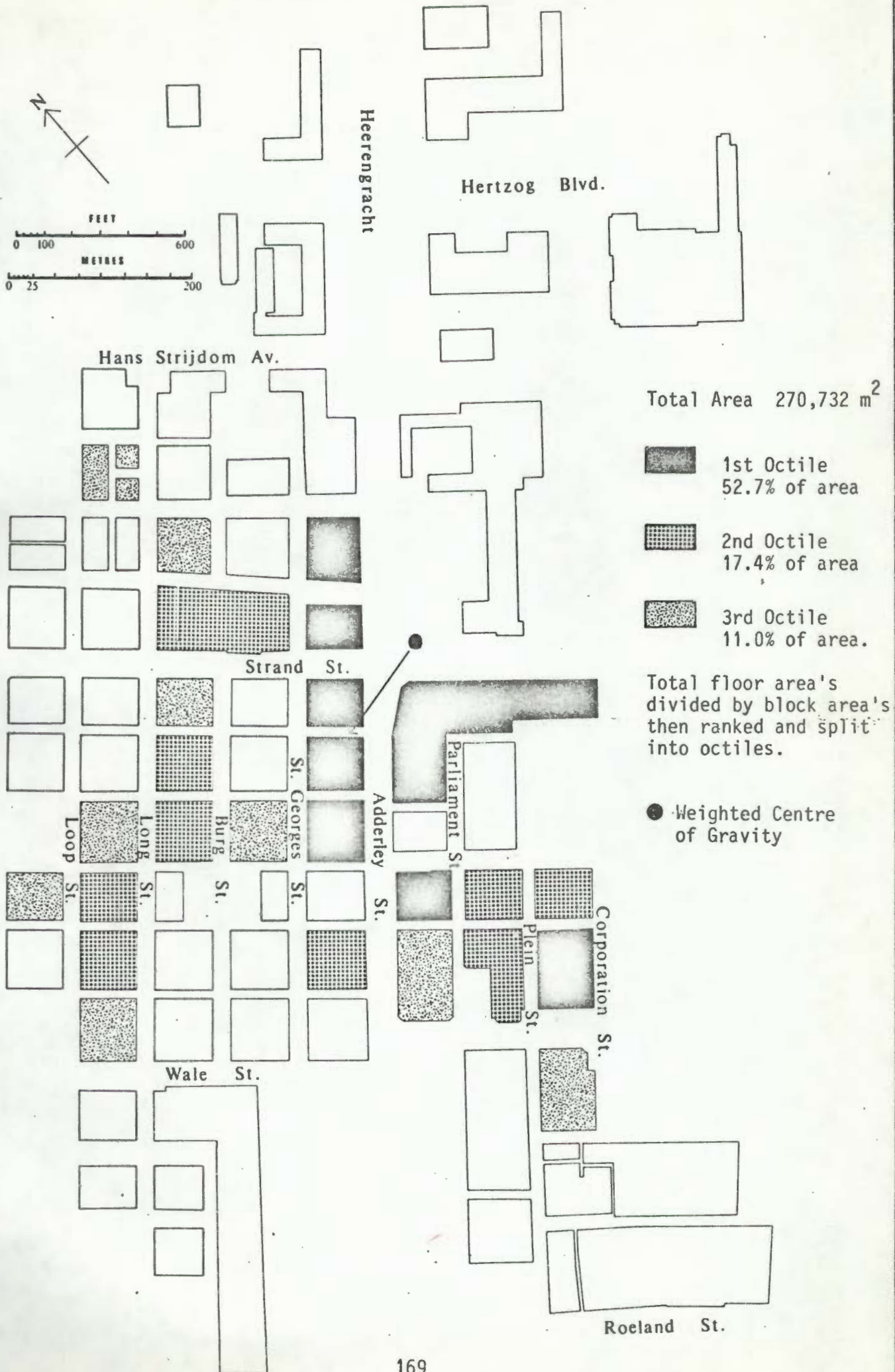
1,618,104 square metres (17,417,300 square feet) in 1970, excluding vacant sites and buildings under construction. Figure 7.1 shows the distribution of 1970 GCA in terms of a bulk factor index, defined as the GCA of a city block divided by the site area of that block.

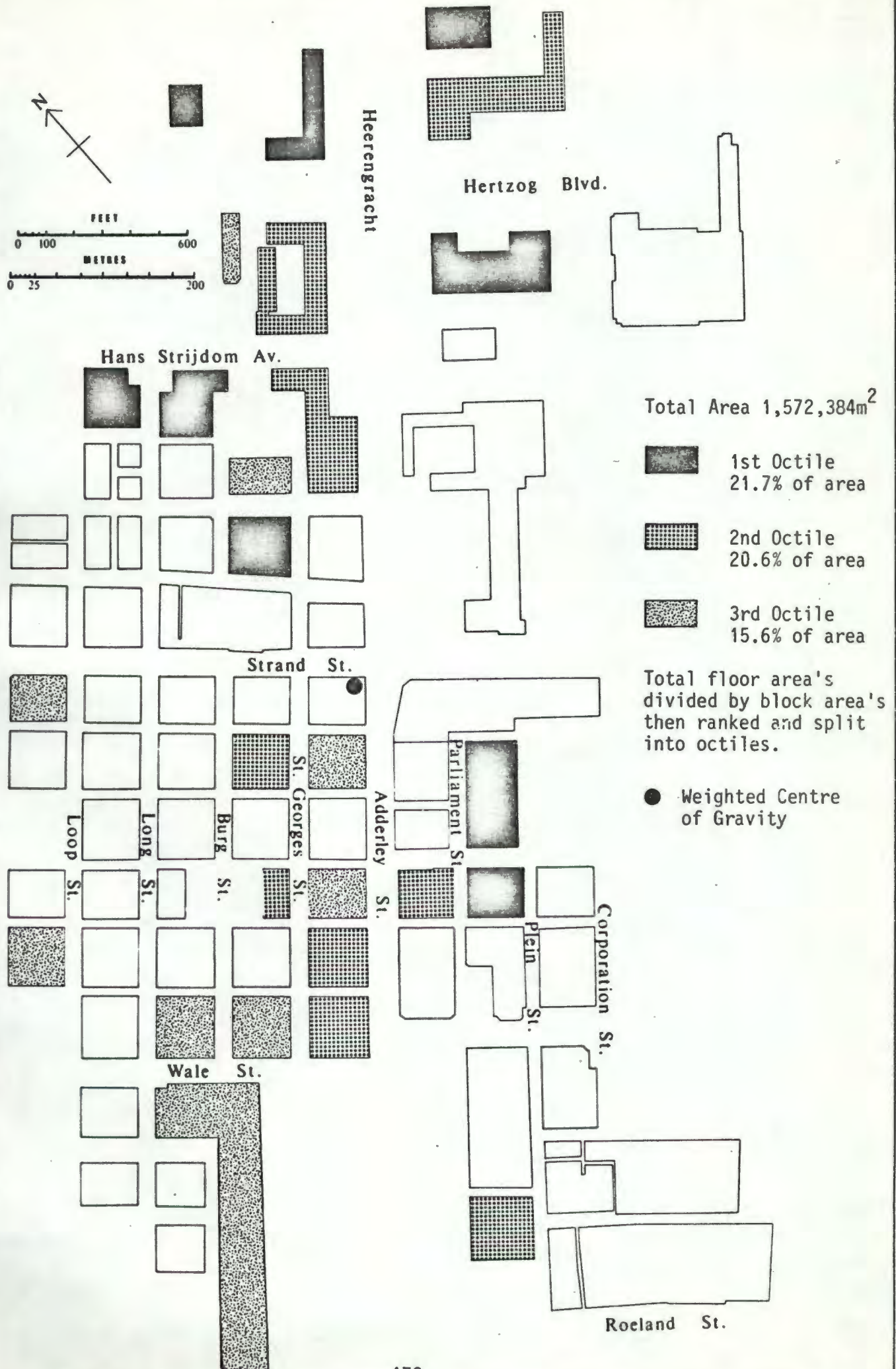
High bulk factor index values in 1970 were concentrated about the Adderley Street/Heerengracht axis with a total of seven of the city blocks identified located within the Retail Core. Blocks within the first octile were about equally divided between the areas north and south of Strand Street, but the majority of second and third octile blocks were located in the old city south of Strand Street. By 1983 (Figure 7.2) the pattern had changed considerably. The main concentration of high bulk factor index values was in the Redevelopment Zone and the Foreshore areas located north of Waterkant Street. All but one of the first octile blocks was located in this area. Five second and third octile blocks remained situated in the Retail Core. During the period a movement northward of slightly in excess of one city block of the weighted centre of gravity of the CBD was recorded.

Figures 7.3 and 7.4 show the distribution of retail space and office space respectively in 1983. Unfortunately it was not possible to reconstruct the distribution pattern of these land uses in 1970. Detailed field data prepared for the CBD frame study conducted by Dewar (1970) was not stored and was thus not available for use. It is, however, possible to make a comparison







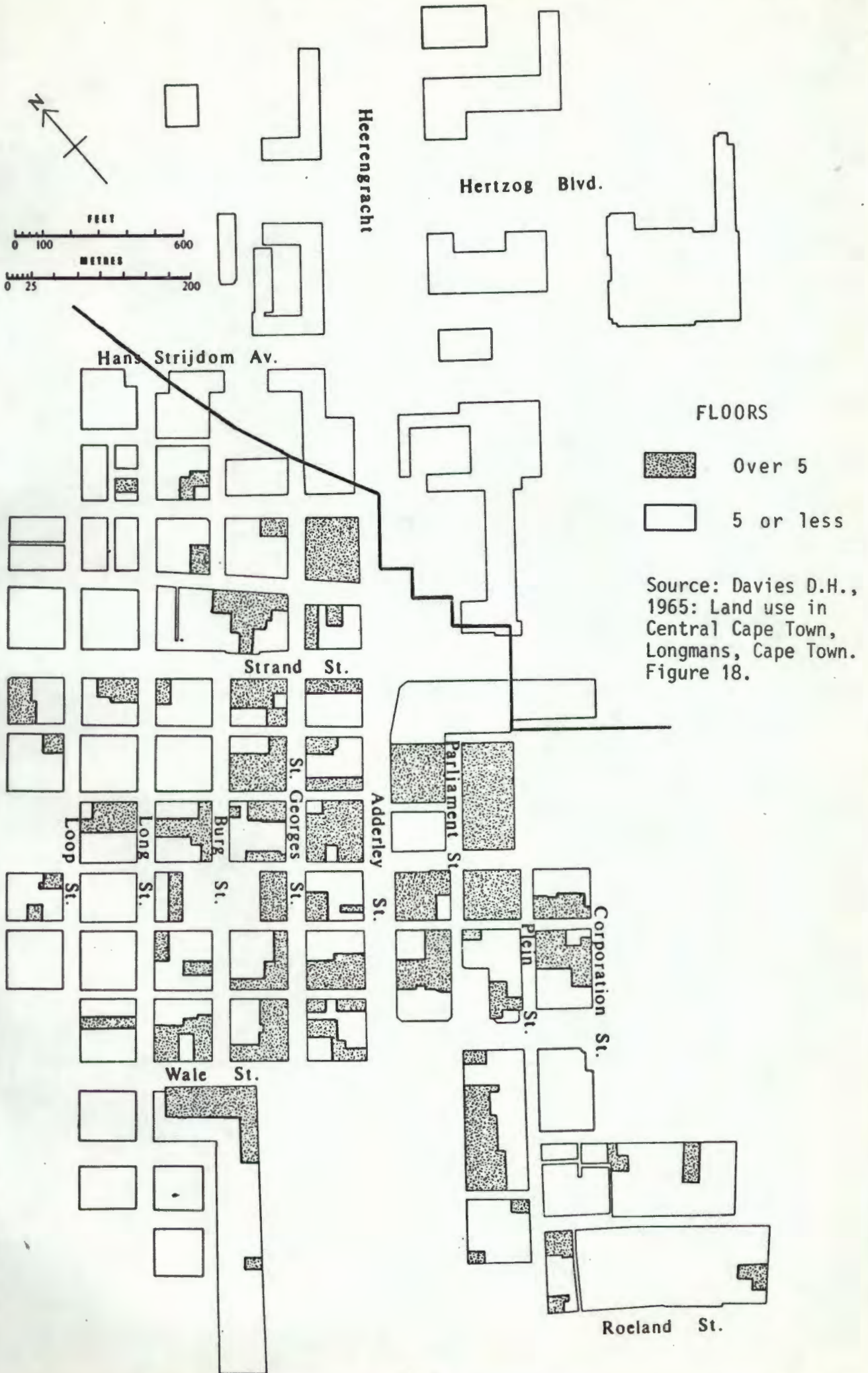


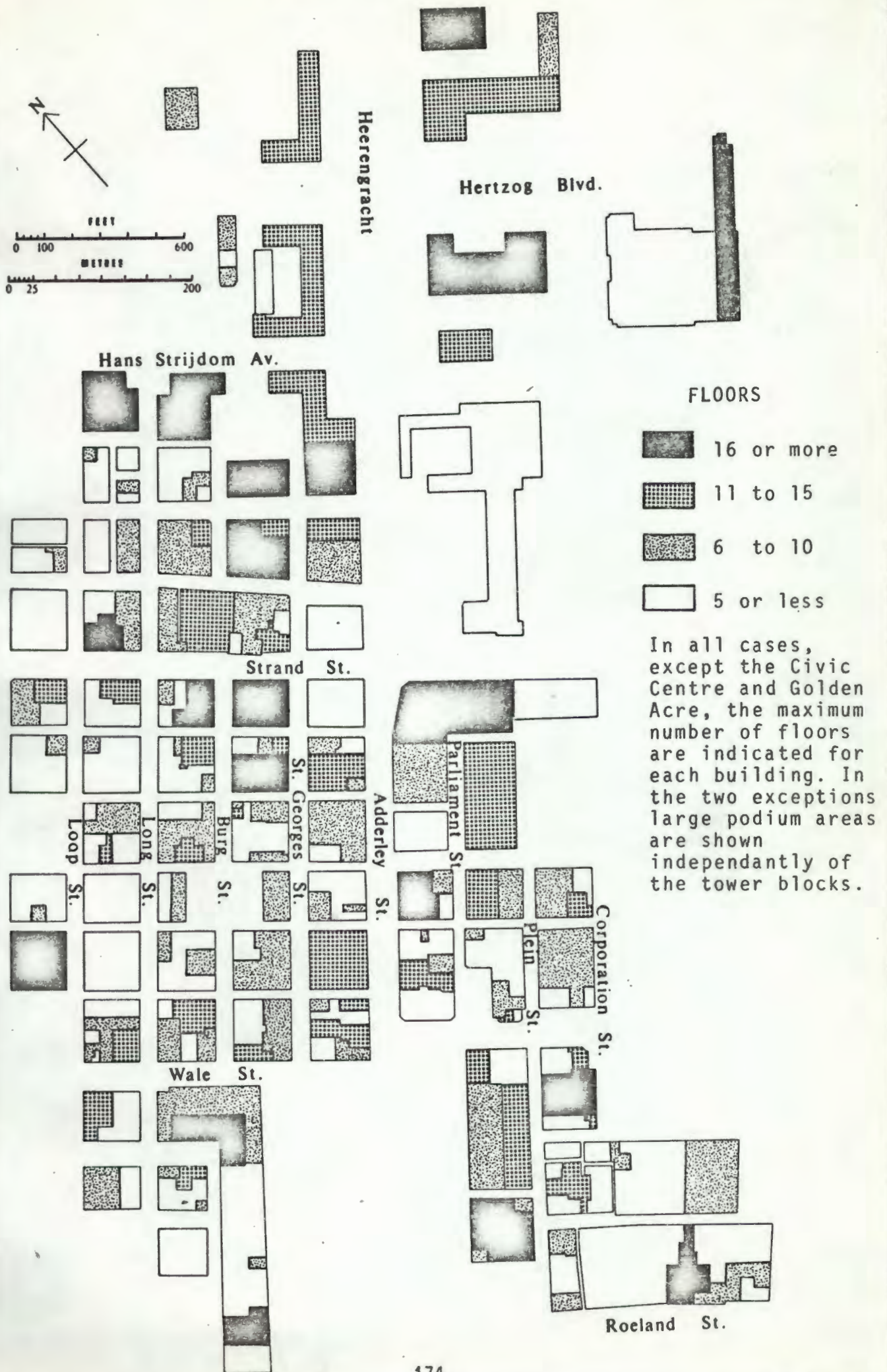
with the locational patterns identified by Davies in his 1965 study of Cape Town's CBD, although the land use categories are not identical. Davies' (1965) Figure 19 shows that in 1957 the 'Central Retail' land use was concentrated in the area bounded by Riebeck, Burg, Church and Plein Street. Figure 7.3 shows that in 1983 retail space was concentrated in the area bounded by Riebeck, St. Georges, Shortmarket, Adderley, Spin, Corporation, Strand and Adderley Street. The Retail Core defined in Chapter 3 was identified on the basis of the Figure. The definition was such that all the first octile blocks were included and in addition a linking corridor of the two highest ranked second octile blocks along Darling Street. The Retail Core thus includes approximately 57 per cent of the total retail floor area of the CBD. It is significant that none of the blocks on the Foreshore is ranked in the first three octiles. It can be concluded that there has been a small movement of retailing activities toward the Foreshore, but without an actual extension of the Retail Core north of Riebeck Street. Rather there has been some relative decline in retailing in the area south of Shortmarket Street, with a major expansion in the vicinity of the Strand Street and Adderley Street intersection where the underground mall and Golden Acre development are located.

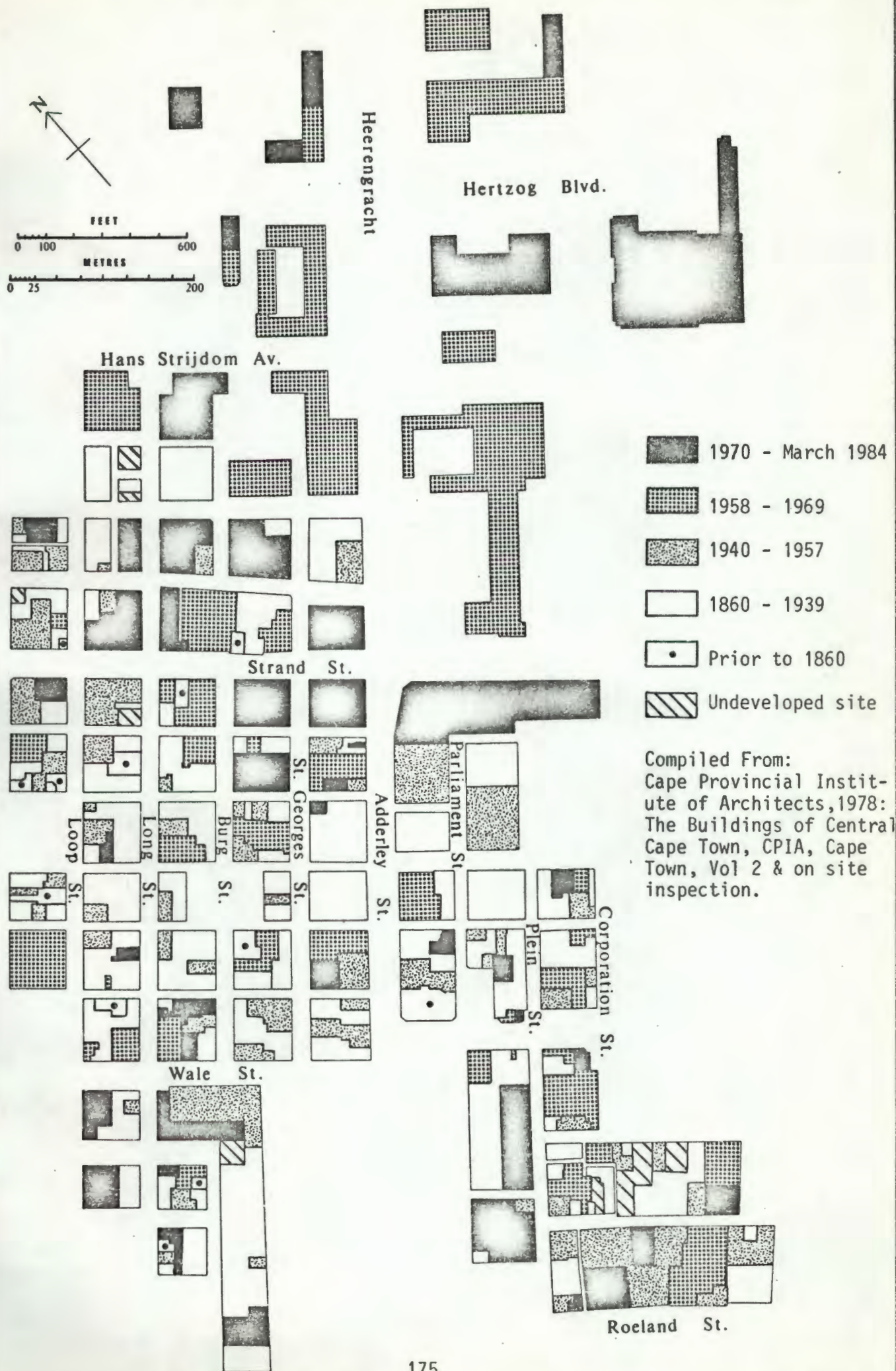
Davies' (1965) Figures 23 and 24 show the location of the 'Financial' and 'General Office' clusters in 1957. Both patterns reflect a concentration of office space in the area bordered by Castle, St. Georges, Hout, Long, Wale, Spin and Plein Street. The area included both the Hard Core of the CBD defined by Davies and

much of the 1957 Retail Core. The office centre of gravity was located in the vicinity of the intersection of St. Georges Street and Longmarket Street. By 1983 (Figure 7.4) there had occurred a major transformation of this pattern. All but two of the first octile blocks were located north of Waterkant Street, although the majority of second and third octile blocks remained within the old office core identified by Davies. The result has been a movement northwards of almost four blocks of the office centre of gravity, situated at the intersection of Strand and Adderley Street in 1983.

The most observable change in the structure of the CBD has been in the scale of its buildings. Not only are buildings higher on average now than they were in 1957 (compare Figures 7.5 and 7.6) but the newest buildings contain a much larger floor area. The average GCA of buildings constructed since 1970 is 18,750 square metres (201,800 square feet) compared to the average area of 5,000 metres squared (54,900 square feet) per building for the CBD in 1983. This has inevitably resulted in an increase in the area of the site occupied by individual buildings. Figure 7.7 shows that new buildings now commonly occupy a whole city block, and generally not less than half a block. This trend is common to other western cities, as has been noted by Daniels (1975) in the case of New York where average areas of new buildings trebled in the period 1950 to 1971, to reach 765,000 square feet (71,000 square metres, Daniels, 1975, p63). The trend may be ascribed to rapid growth in demand, economies of scale in both construction







and administration, user convenience, taste, high land values and the effect of speculative institutional investment. Figures 7.6 and 7.7 show that the effect of the Foreshore development has been to concentrate newer and taller buildings (constructed since 1958) in the area north of Strand Street.

Although the Foreshore has markedly influenced the form and structure of the contemporary CBD, the development program envisaged for the area in the period 1947 to 1980 had not been fully attained by 1983. Indeed 25 per cent of the available area remained undeveloped. The development lag has occurred notwithstanding significant metropolitan growth in population and employment that greatly exceeds the original Foreshore Joint Technical Committee estimates. What was not envisaged by the Technical Committee was that a largely underutilised area of the old city marginal to the new Foreshore and endowed with a high level of CBD centrality consequent to the emergence of the Foreshore and the relocation of the railway station would experience redevelopment growth. A large proportion of buildings constructed since 1958 has been located in the area between Hans Strijdom Avenue and Castle Street - the area that has been termed the Redevelopment Zone (Chapter 3) - as is clearly shown by Figure 7.7. The trend has accelerated during the 1980's, with a total of six buildings, involving about three and three quarter blocks, scheduled for completion by the end of 1986. In contrast only one construction project is in progress north of Hans Strijdom Avenue and five in the remainder of the CBD.

CHANGES IN COMPOSITION

A comparison of the land use composition of the CBD in 1957 and 1983 is given in Table 7.2. The land use composition in 1957 is derived from Davies (1965) and that for 1983 from the land use survey conducted for the present study appropriately modified to conform to Davies' land use categories. It is clear from Table 7.2 that the land uses which make up the CBD have been subject to different growth rates. A considerable change in the land use composition of the CBD has thus taken place. The change is graphically illustrated in Figure 7.8. In the figure the area of segments is proportional to the area occupied by each land use in the respective years.

Table 7.2 and Figure 7.8 demonstrate that growth has been concentrated in the Financial, Service & General and Government Office categories, in Parking and to a lesser extent in Hotels. Relative decline was experienced by Retail and Organizational Office categories. Absolute decline was experienced by Residential, Factory and Vacant Sites categories.

The CBD has grown at an overall rate of 2.4 per cent per annum compounded. Growth rates of particular land use categories have ranged from yearly rates of 9.1 per cent for Public Transport & Parking (mainly parking) through 4.5 per cent for Vacancy, 4.2 per cent for the Financial Office sector, 3.5 per cent for Government Offices, 2.9 per cent for Hotels, 2.6 per cent for Service & General Offices and 1.1 per cent for Shops. Declines

TABLE 7.2

CHANGES IN THE COMPOSITION OF THE CBD - 1957 TO 1983

LAND USE	1957 AREA	1983 AREA	INCREASE (%)	GROWTH RATE* (% PER ANNUM)
Shops, Other, and Garages.	260,467	349,210	+34%	+1.1%
Hotels.	30,908	63,765	+106%	+2.9%
Residential.	14,188	10,497	-26%	-0.9%
Factories.	70,620	20,464	-71%	-2.1%
Financial* Offices.	114,386	332,490	+190%	+4.2%
Services,* Commercial, Airline, Shipping, Freight and Diplomatic Offices.	365,818	678,900	+86%	+2.6%
Government* Offices.	168,407	404,105	+140%	+3.5%
Organizational* Offices.	36,222	41,860	+16%	+0.6%
Public Transport and Parking.	26,955	259,317	+862%	+9.1%
Vacant Gross Construction Area.	32,855	106,320	+224%	+4.5%
Vacant Sites.	156,094	59,411	-62%	-1.9%
Museums & Churches.	N/A	4,751	N/A	N/A
All Space.	1,276,514	2,348,240	+84%	+2.4%
All Occupied* Office Space.	684,833	1,457,355	+113%	+3.0%

All areas are in square metres. Growth rates are compound.
Categories and 1957 areas adapted from Davies D.H., 1965: Land
Use in Central Cape Town, Longmans, Cape Town, Table 8.

Land Use Composition

FIGURE 7.8

PUBLIC TRANSPORT & PARKING

FACTORIES

RESIDENTIAL

HOTELS

VACANT &
CONSTRUCTION
SITES

RETAILING,
GARAGES AND
'OTHER'

FINANCIAL
OFFICES

SERVICE,
GENERAL COMMERCIAL,
DIPLOMATIC, AIRLINE
SHIPPING AND
FREIGHT OFFICES

GOVERNMENT
OFFICES

1957
Total Gross Space in
Davies CBD:
1,276,514 m²
(includes vacant Fore-
shore sites)

VACANT FLOOR SPACE
ORGANIZATIONAL OFFICES

VACANT & CONSTRUCTION
SITES
MUSEUMS AND
CHURCHES
FACTORIES
RESIDENTIAL
HOTELS

PUBLIC TRANS-
PORT & PARKING

FINANCIAL
OFFICES

SERVICE,
GENERAL COMMERCIAL,
DIPLOMATIC, AIRLINE,
SHIPPING AND FREIGHT
OFFICES

RETAILING,
GARAGES AND
'OTHER'

GOVERNMENT
OFFICES

VACANT
FLOOR SPACE

ORGANIZATIONAL
OFFICES

1983
Total Gross Space:
2,348,240 m²
(includes vacant
Foreshore sites)

(page 179)

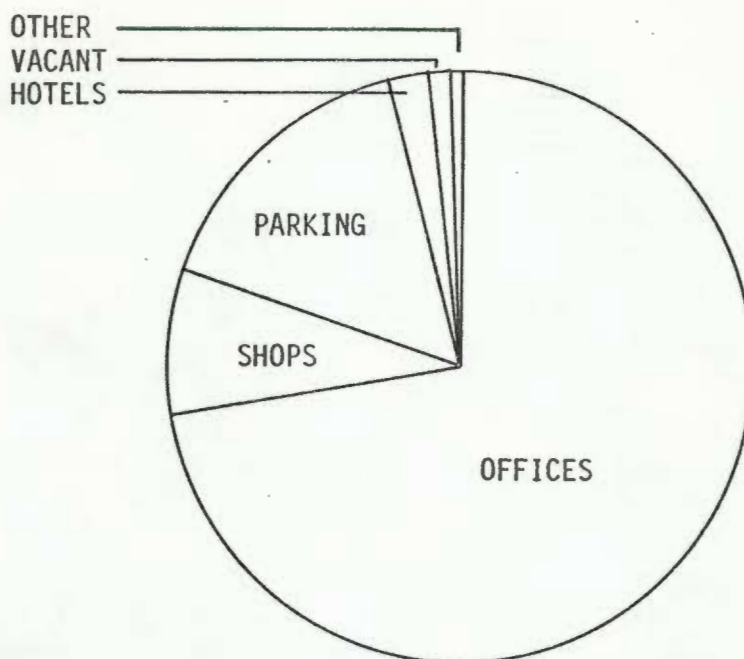
1957 data from: Davies D.H., 1965: Land Use in Central Cape Town, Longmans, Table 8

T.W.R. 1984

Present Use of Space Built Since 1970

FIGURE 7.9

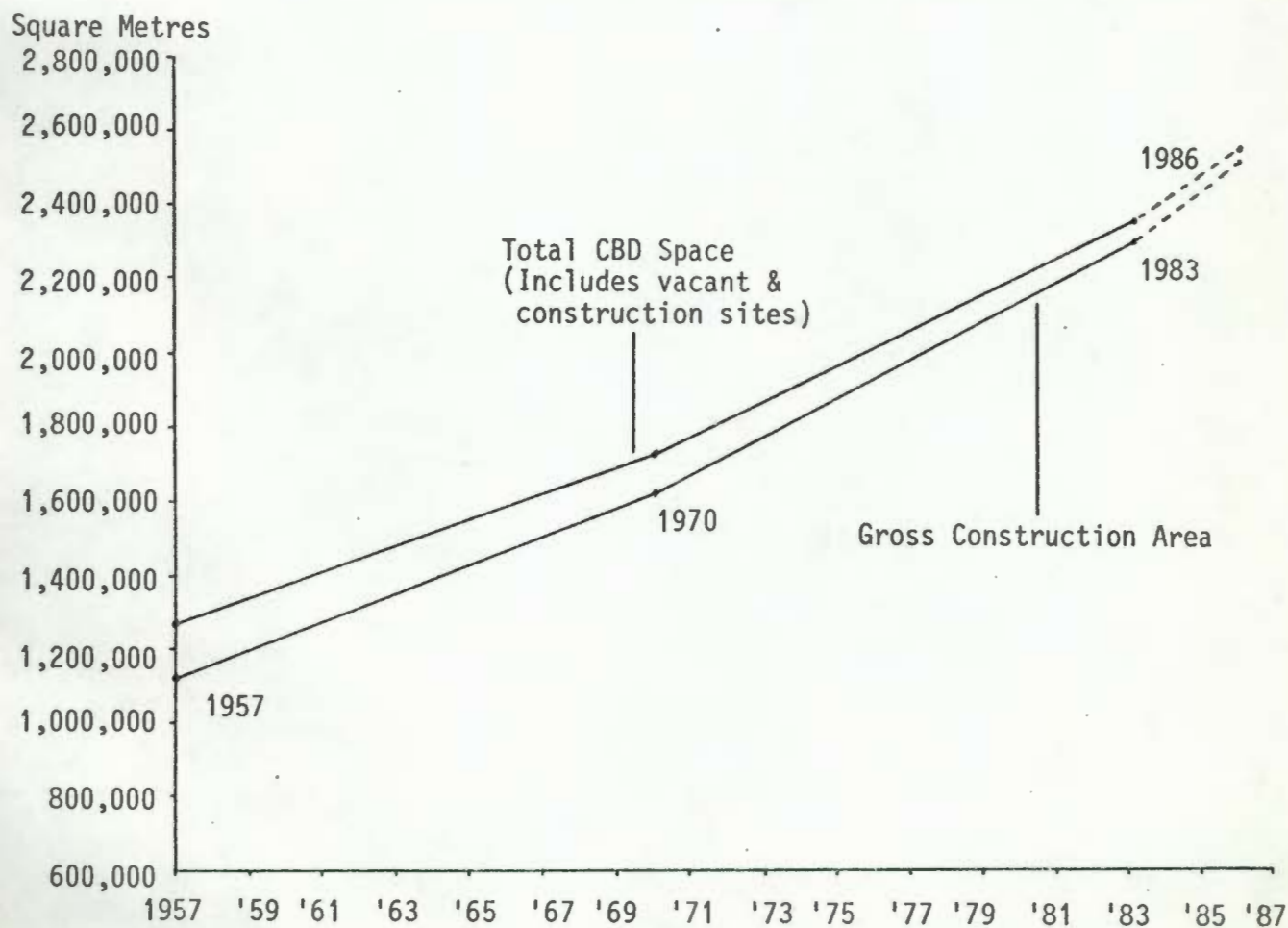
(page 180)



Total Gross Floor
Space Built 1970-1983:
731,401 m²

CBD Floor Space Growth

FIGURE 7.10



1957 data from: Davies D.H., 1965: Land Use in Central Cape Town,
Longmans, Cape Town, Table 8.

T.W.R. 1984

have occurred at the rate of 0.9 per cent per annum for Residential land uses, 1.9 per cent per annum for Vacant Sites and 2.1 per cent per annum for Factories.

Figure 7.9 represents an analysis of the present usage of the 731,401 square metres (7,872,800 square feet) of GCA built since 1970. Of the total space created 72 per cent was occupied by office establishments, approximately 16 per cent by covered parking and 8 per cent by retail establishments. Occupance by other land uses was insignificant by comparison. The trend revealed by these findings is a particularly powerful one where the relative growth of office space and parking has greatly exceeded that of other land uses. The trend may be ascribed to the growth in office activities, the decentralisation of retailing and increasing use of private transport. Since there is no evidence that the trend will change, it may be suggested that the proportion of the CBD occupied by office and parking space will continue to increase, with a concomitant relative or absolute decline in the proportion of space occupied by other land uses.

To bodies involved with planning development of the CBD a knowledge of future growth trends in the CBD is likely to be of considerable importance. It is to that question that the discussion following is directed. Attention will be given in particular to the possible growth trends of the office sector in terms of the demand for office space to the year 2000 and the

estimated supply of GCA in the short term to 1986.

OFFICE FLOOR SPACE DEMAND

A variety of projections of the requirement for GCA in the central city may be and have been made. Given the information available in the present study growth rates in GCA demand may be projected in several ways. Demand may, in the first instance, be estimated on the basis of the historical trend line over the period 1957 to 1983. Secondly, responses to questions soliciting information on future space needs in the survey questionnaire (see Appendix 2) provide significant evidence on possible demand trends. Finally, demand may be estimated through the use of time series projections of future population growth in the city derived from Brand (1983).

Table 7.3 is derived from Table 7.2 and represents a projection based on historic trends recorded from 1957 to 1983 projected to 1986 and the year 2000. Using the growth rates of individual land use categories it is estimated that the demand for GCA by CBD land uses in 1986 will be 2,396,400 square metres (25,794,850 square feet). The estimate excludes vacant premises and sites. Major demand will be for 142,545 square metres (1,534,400 square feet) by office uses, 77,383 square metres (832,900 square feet) for parking and 11,690 square metres (125,800 square feet) for retailing uses. Estimates of demand in the Public Transport and Parking category, though, were problematic. The growth rate for that category between 1957 and 1983 was 9.1 per cent per annum

TABLE 7.3

PROJECTED DEMAND FOR GROSS CONSTRUCTION AREA

LAND USE	1983 AREA	GROWTH RATE	1986 AREA	2000(A) AREA	% OF CBD	2000(B) AREA
Shops, Other, Garages.	349,210	+1.1%	360,900	420,000	9.4% (10.9%)	330,000 383,000
Hotels.	63,765	+2.9%	69,500	103,000	2.3% (2.7%)	81,000 95,000
Residential.	10,497	-0.9%	10,200	9,000	0.2% (0.2%)	7,000 7,000
Factories.	20,464	-2.1%	19,200	14,000	0.3% (0.4%)	11,000 13,000
Financial Offices.	332,490	+4.2%	376,100	669,000	15.0% (17.3%)	527,000 608,000
Service, Commercial, Airline, Shipping, Freight, and Diplomatic Offices.	678,900	+2.6%	733,200	1,050,000	23.6% (27.1%)	829,000 952,000
Government Offices.	404,105	+3.5%	448,000	725,000	16.3% (18.7%)	573,000 657,000
Organizational Offices.	41,860	+0.6%	42,600	46,000	1.0% (1.2%)	35,000 42,000
Public Transport and Parking.	259,317	+9.1% (+4.6%)	336,700 296,800	1,140,000 557,000	25.6% 14.4%	900,000 506,000
Vacant Gross Construction Area	106,320	+4.7%	122,000	232,000	5.2% (6.0%)	183,000 211,000
Vacant Sites.	59,411	-1.9%	56,000	42,000	0.9% (1.1%)	32,000 39,000
Museums and Churches.	4,751	N/A	N/A	N/A	N/A	N/A
TOTALS	2,348,240	+2.4%	2,574,400 (2,534,500)	4,451,000 3,868,000		3,508,000 3,513,000

2000(A) Estimate: Land use areas projected forward at individual land use growth rates.

2000(B) Estimate: Total area projected forward at overall growth rate of 2.4% p.a. Allocated to land uses using '% OF CBD' data derived from 2000(A) estimate.

Figures in brackets use the 1970-1983 growth rate of 4.6% per annum for Public Transport and Parking.

compounded. The use of a small initial base meant that the calculated growth rate for the period was high and unrealistic as a rate upon which to project the future. A more realistic growth rate was sought by reference to the quantity of Parking space constructed since 1970 (Figure 7.9). On that basis the estimated growth rate over the period 1970 to 1983 was 4.6 per cent per annum compound. That rate was considered to be more acceptable and has been adopted for use in the present study. In consequence the projected 1986 demand for total GCA for the CBD was revised to 2,356,500 square metres (25,365,360 square feet), and the additional demand generated by the Public Transport and Parking land use to 37,483 square metres (404,470 square feet). It is projected that vacant premises and sites will occupy a further 178,000 square metres (1,915,992 square feet) to give the CBD an estimated total of 2,534,500 square metres (27,281,358 square feet) of space of all types.

The growth in occupied GCA will thus be approximately 174,000 square metres (1,873,000 square feet) by 1986. If the currently vacant premises (106,320 square metres (1,144,428 square feet) are taken up first there will be a total requirement for approximately 68,000 square metres (731,900 square feet) of new GCA of all types by 1986. It is, however, most improbable that a situation in which no vacancy existed could ever be attained, due to the continual process of 'births', relocation and 'deaths' taking place among CBD establishments. It is suggested that a 'Natural Rate of Vacancy' necessary to the efficient functioning

of the CBD property market exists. The concept is borrowed from Labour Economics where a factor termed the 'Natural Rate of Unemployment' is an accepted component of employment structure (see Alchian and Allen, 1977, pp470-472).

Davies (1965) found that 2.9 per cent of total floor area was vacant in 1957, while in the present study the ratio was 4.6 per cent of total GCA. The figure for 1983 may be regarded as high, as it included vacant premises subsequently occupied a month after the survey was completed by the City Park Hospital. The exclusion of these premises would reduce the vacancy rate in 1983 to 3.6 per cent. These values suggest that the Natural Rate of Vacancy for Cape Town falls within the 3 to 4 per cent range. For the present study the figure of 4 per cent has been adopted. On that basis it is estimated that a total of approximately 101,000 square metres (1,087,000 square feet) will be required as natural vacancy by 1986. A total requirement for new GCA of approximately 169,000 square metres (1,819,000 square feet) will thus arise by the end of 1986.

In projecting the estimates in the longer term to the year 2000, careful consideration must be given to the method of estimation that is to be adopted. Table 7.3 columns 2000(A) and 2000(B) demonstrate two alternative estimates of GCA. Column 2000(A) in the table is derived from the use of the growth rates of individual land use categories, assuming the high growth rate of 9.1 per cent per annum for Public Transport and Parking. If, alternatively, it is assumed that the growth rate of Public

Transport and Parking will be 4.6 per cent per annum, then the procedure estimates that there will be a total of 3,868,000 square metres (41,635,000 square feet) of total space in the CBD in the year 2000 (the figures based on 4.6 per cent per annum growth in Public Transport and Parking are stated in brackets in Table 7.3). If, alternatively, the average growth rate of the CBD of 2.4 per cent per annum is used, then it is estimated that there will be a total of 3,514,000 square metres (37,824,000 square feet) of all types of space by the year 2000. It is considered that it is more probable that the CBD will maintain it's historic growth rate rather than accelerating to the higher growth rate required by the column 2000(A) estimates. Thus a second set of estimates is given in Table 7.3 in column 2000(B). These estimates are derived from the use of the overall growth rate of 2.4 per cent per annum and the proportions of the CBD occupied by each land use given in the table. The proportions are derived from the column A estimates.

Assuming that the growth rate in Public Transport and Parking GCA built will be 4.6 per cent per annum, then growth in the period to the year 2000 is expected to be concentrated in the office and parking sectors (Column 2000(B) figures in brackets). Occupied office GCA is projected to amount to 64 per cent of the CBD, Parking 14 per cent and Retailing 11 per cent. The figures for 1983 were 62 per cent, 11 per cent and 15 per cent respectively. Thus the relative decline of the retail sector is expected to continue, with a growing dominance of office activities within

the CBD.

The projections may be compared with those derived from other sources. For example, Brand (1983, p3) estimated that the metropolitan population would reach 2,246,700 persons in the year 2000. It will be recalled from Chapter 2 that the CBD contained 1.388 square metres (14.94 square feet) of GCA per capita, rising to 1.569 square metres (16.89 square feet) per capita by 1983. By the year 2000 the figure can be expected to reach 1.70 square metres (18.30 square feet) per capita. On the basis of Brands population projection the CBD could contain 3,835,000 square metres (41,280,000 square feet) of GCA by the year 2000. The figure is 10 per cent higher than the value estimated in cloumn 2000(B), but within 0.2 per cent of the value cited in column 2000(A) (both assuming 4.6 per cent per annum growth in Public Transport and Parking land use). On these bases it is suggested that the estimates contained in Table 7.3 may be assumed to approximate upper and lower limits of growth of CBD GCA.

Respondents to the questionnaire were requested to estimate anticipated additional space requirements by 1988 (that is for a short term five year future). On the basis of the responses it is estimated that existing office establishments will require approximatley 130,000 square metres (1,399,000 square feet) of additional net office space in the period to 1988. That value is equivalent to 170,000 square metres (1.83 million square feet) of GCA using a conversion factor of 1.3 suggested by Brand (1978, pl2). The earlier calculations may be used to show that by 1988

the additional GCA required by the office sector will be approximately 246,000 square metres (2,648,170 square feet). The estimate based on questionnaire responses is lower, but it only represents existing office sector growth and excludes the space requirements of new establishments. If those needs are taken into account a fair degree of correspondence is achieved.

FLOOR SPACE SUPPLY

Available data enable estimates of increases in GCA supply to be made only in the short term to 1986. A projection may be derived from estimates of GCA contained in buildings completed since the 1983 land use survey, those presently under construction, and those for which plans have been announced.¹ At present eleven projects will have been completed by 1986. These buildings will result in the addition of approximately 229,000 square metres (2,465,000 square feet) of GCA, and the demolition of 15,500 square metres (166,800 square feet) of existing GCA. Thus there will be a net increase in supply of 213,500 square metres (2,298,200 square feet) of GCA by 1986.

There are two additional construction projects currently in progress beyond the defined CBD boundary which could be considered to represent an impending expansion of the CBD. The two city blocks involved are adjacent to the present western

¹ The information on these buildings derives from Finance Week February 2-8, 1984, ppl47-149, Financial Mail January 27, 1984, p63, August 3, 1984, p64, or is an estimate.

boundary and are located on either side of Wale Street (see Figure 7.10). The GCA to be added by the completion of these¹ projects is about 35,700 square metres (384,300 square feet). Thus the additional supply of all types of floor space anticipated by 1986 may be amended to 249,200 square metres (2,682,400 square feet) of GCA. These estimates imply that the CBD may be expected to contain 2,538,000 square metres (27,319,000 square feet) of GCA by the end of 1986.

IMPLICATIONS OF THE PROJECTIONS

In the short term to the end of 1986, it is estimated that the total demand for GCA by all land uses will be 2,356,500 square metres (25,365,360 square feet), excluding vacant premises and sites. Total supply of GCA is projected to be 2,538,000 square metres (27,319,000 square feet), indicating that 181,500 square metres (1,953,640 square feet) will be standing vacant. On the assumption that the historic Natural Rate of Vacancy is maintained, approximately 101,000 square metres (1,087,000 square feet) will represent natural vacancy leaving about 80,000 square metres (861,000 square feet) in excess GCA supply. It is anticipated that almost all the vacancy will comprise vacant office premises, as was found to be the case in 1983.

The Revised Final Statement of the Proposed Town Planning Scheme (1982), makes provision for the construction of a total of

¹ The information on these buildings is derived from the Cape Times, January 25, 1984 and an estimate based on site area.

approximately 3.4 million square metres (36.6 million square feet) of GCA within the defined boundaries of the present CBD. The estimate includes the remaining vacant Foreshore sites north¹ of the present CBD boundary. The lowest projection of total GCA required by the year 2000 is 3.475 million square metres (37.505 million square feet), excluding vacant sites (Column 2000(B) Table 7.3). It may be anticipated that either a considerable lateral expansion of the CBD, or a relaxation of existing planning controls will be necessary to accomodate projected GCA requirements. Alternatively a higher level of decentralisation of CBD land uses than has been the case to the present will be necessary. This finding carries important implications. It is likely that pressure for the development of all existing sites to their maximum permissable bulk will be exerted throughout the 1990's. Congestion in the CBD will increase as a concomitant factor (discussed separately below). More importantly, however, a severe threat to the continued existence of older and historic buildings located in the CBD will develop. The bulk contained in many of these buildings is substantially below levels permitted for their sites. Efforts to conserve the character of older parts of the CBD are thus likely to become more and more difficult.

¹ The estimate is derived from using bulk factors given in the Final Statement of the Town Planning Scheme. It should be noted that bulk factors are not specified for areas formerly controlled by the Foreshore Planning Board. For these areas buildings are supposed to fill strictly defined planning envelopes specified by the Cape Town Foreshore Joint Technical Committee. The average bulk factor of 7.48 for existing Foreshore buildings was used to estimate the permissable bulk of the vacant Foreshore sites. 3.4 million square metre represents an average bulk factor of 8.22 for the CBD, excluding the site of the railway station.

It has been suggested that certain areas of Cape Town form significant historical zones worthy of conservation. In the CBD such historical zones might include southern Long Street, Church Square, Greenmarket Square and Queen Victoria Street. It is important that conservation authorities be alert to the threat posed by likely future redevelopment pressures, so that timeous action can be taken. At the present time no protection is provided for historical areas, except in the case of declared National Monuments, although a byelaw to permit the freezing of development in declared historic zones is currently under consideration by the City Council. It should be noted that if protection is given to historic zones within the CBD, redevelopment pressures may be expected to intensify in remaining areas.

THE INTRA-CBD LOCATION OF GROWTH

In preceeding chapters common locational patterns of land use groups were studied. The Factor Analysis applied to the land use data led to the identification of six distinct functional zones within the CBD (Figure 5.41). It is obviously desirable that the growth characteristics of the functional zones be determined. That end may be attained by integrating information on the growth rates of individual land uses derived from the questionnaire survey by functional zones. The process will permit the identification of the relative degrees of growth in GCA for the individual functional zones in the CBD.

Questionnaire responses sorted by the six land use groups (Factors of functional zones) yielded information on anticipated increases in the occupation of office GCA between 1983 and 1988. The estimated increases for the six land use groups (Factors or functional zones) in office GCA for the period are illustrated in Table 7.4.

TABLE 7.4 ANTICIPATED OFFICE GCA GROWTH 1983 - 1988

FACTOR 1	14.0%
FACTOR 2	10.9%
FACTOR 3	15.3%
FACTOR 4	12.6%
FACTOR 5	22.5%
FACTOR 6	8.9%

The data presented in Table 7.4 suggests that the growth in office GCA is likely to be most rapid in the land use groups represented by Factors 1, 3 and 5. The three functional zones all have a spatial association to some extent with the Retail Core and the centre of gravity of the CBD. These are thus the most centrally located functional zones in the CBD. Though the actual GCA occupied by the land use group is relatively small, the most rapid increase in demand (22.5 per cent) is anticipated in the Factor 5 group located in a zone about the railway station and overall CBD centre of gravity. In land use groups 1 and 3 anticipated growth in demand for GCA is between 14 and 15.3 per cent for the period. These land use groups tend to be distributed within the Retail Core or in an immediate zone about it.

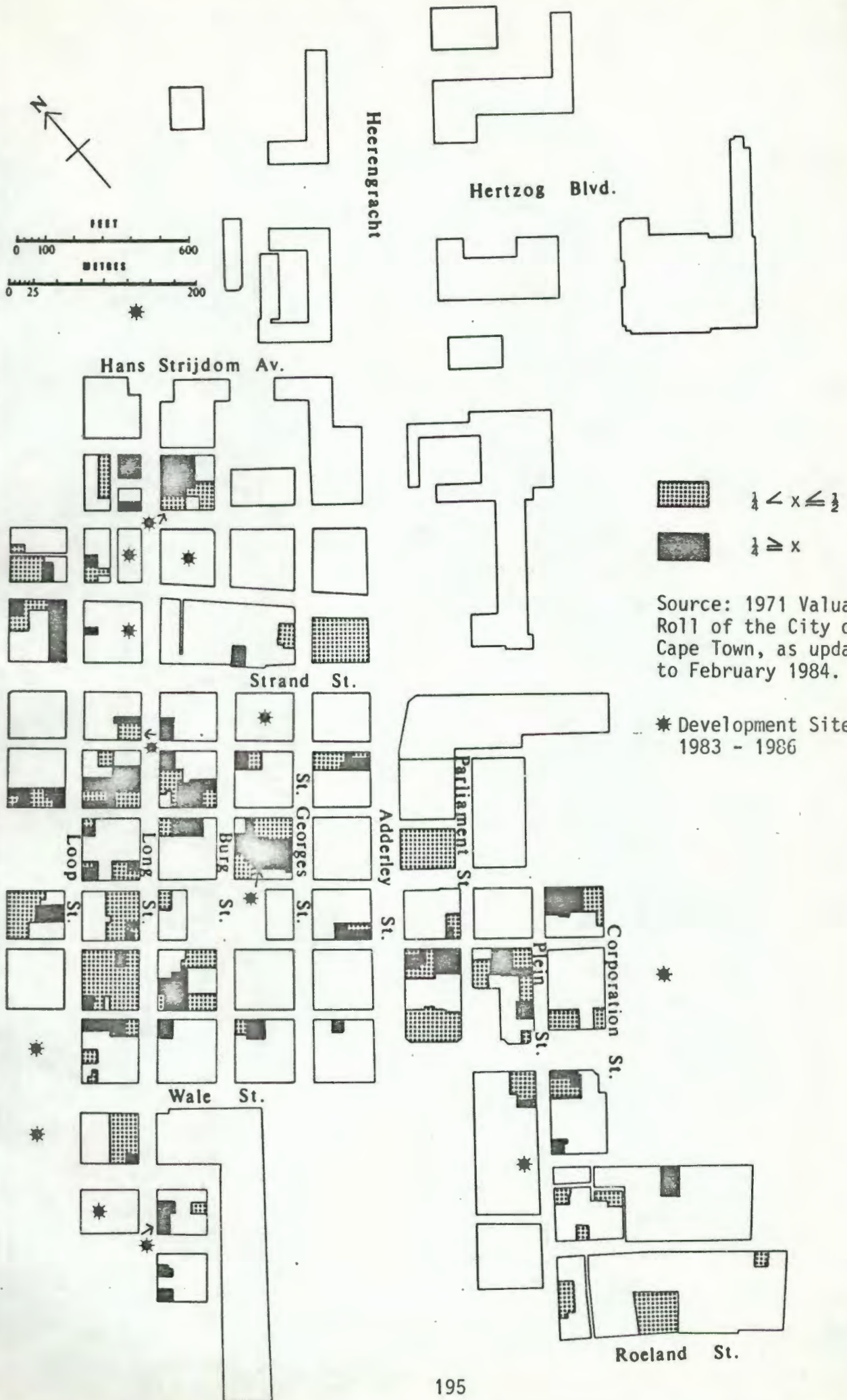
The three land use groups for which anticipated growth in GCA is least are groups 2, 4 and 6. These land use groups are spatially the most peripheral in the CBD. Anticipated growth in land use group 4, located in the western periphery of the CBD, 12.6 per cent. For land use group 2, distributed on the Foreshore and in the Redevelopment Zone, a growth of 10.9 per cent is anticipated. Finally, for land use group 6, consisting mainly of government offices located off upper Plein Street, the anticipated growth is 8.9 per cent.

From the evidence, it is apparent that the most centrally located land use groups (Factors or functional zones) in the CBD are expected to show the most rapid growth. The more peripherally situated a land use group the lower is its anticipated growth rate. This finding corresponds to that suggested by conventional theory. Although no evidence to explain the trend is available, it may be ascribed to the benefits conferred by the most central locations (in terms of such factors as high accessibility, improved contact with clients and high visibility), and the tendency for less successful, and thus slower growing firms, to be unable to afford the high rents generally charged for centrally located premises.

In the projection of anticipated growth of individual sectors of office activity carried out in earlier sections of this Chapter (Table 7.3) it has been shown that the Financial Office use will experience the most rapid growth in demand for GCA in the longer term, that is to 2000. Office uses in descending order of

anticipated long term percentage growth were identified as Financial Offices, Government Offices, Commercial and General Offices, and Organizational Offices. Although these categories do not correspond to the land use groupings identified by the Factor Analysis, the evidence of their growth trends appears to suggest that long term growth in the demand for office GCA will be most rapid in the vicinity of the Retail Core and southern periphery of the CBD. These are the areas identified by the Factor scores derived from Factor 1 and Factor 6 on which Financial Offices and Government Offices respectively load highly.

The foregoing discussion only presents evidence on the potential demand for GCA. For a particular area of the CBD to record an actual increase in available GCA there must be an addition to the supply of GCA in that area. In the period to 1986 it is possible to be relatively precise in identifying the location of new supplies of GCA since the locations of buildings presently planned or under construction are known. The locations of fifteen construction projects planned for completion between 1983 and 1986 are shown in Figure 7.11. As previously discussed, almost half of the new buildings are situated in the Redevelopment Zone. No developments are situated in the Retail Core, and only two, of which one is an hotel, are located in areas adjacent to the Retail Core. The majority of the remaining construction projects are located in the southern peripheral areas of the CBD, or just beyond the CBD boundary in that area.



Also indicated in Figure 7.11 is the ratio of rateable building to rateable land value for each lot in the CBD. Rateable land values have been taken to represent the potential rents to be derived from the optimum utilisation of a site, and rateable building values to represent the actual rents being derived from the existing uses of the site. The assumption is made that floor space rentals are inversely related to building age. In terms of the valuation procedure the rateable value of a building is determined by the cost of construction at the time a valuation is made less accumulated depreciation, and is thus also inversely related to age.

It is suggested that the viability of redeveloping any particular site increases as the difference between the actual rent and potential rent to be derived from the site widens. Thus those sites identified in Figure 7.11 as being characterised by low ratios, i.e. where the building was worth less than half the value of the land, may be considered the most likely locations for future new construction. The effectiveness of the indicator may be gauged from the fact that in the five instances of redevelopment projects where the values of the previous buildings were known, every site had a building to land value ratio of less than one half. This is almost certain to have been the case for at least six of the remaining ten construction projects.

It is evident from Figure 7.11 that the greatest redevelopment potential, and thus the most likely locations for future

additions to the supply of GCA, are concentrated in the western periphery of the CBD, and in particular along the Long Street axis. There is an additional concentration toward the eastern end of Longmarket Street. Elsewhere in the CBD it is apparent that few high potential sites will remain once the current construction programme is completed. This is particularly the case in the Redevelopment Zone where almost the only remaining areas suitable for redevelopment will be located west of Long Street by 1986. In the Retail Core the only significant high potential area is the block located at the intersection of Strand and Adderley Street. Although modern, the present building is small in scale. It was proposed to add a 20 storey office tower to the existing three storey shopping centre, but this project has been suspended due to the present economic depression. In the area of the old city adjacent to the Retail Core several high potential sites are indicated. On further examination, though, many of these must be ruled out. Included in such sites is that bordering on Adderley and Spin Streets, occupied by the Groote Kerk (a National Monument), and the block situated between Adderley and Parliament Streets on which the historic Standard Bank building is located.

It may thus be concluded that although the most rapidly growing office land uses are presently concentrated in the area in and adjacent to the Retail Core, including the Redevelopment Zone, and also in the Government complex on Plein Street, there is relatively little remaining potential for additions to the supply

of GCA in any of these areas. Thus it is suggested that those land uses which do not require high accessibility to the public will continue to be forced out of the more central locations in and near the Retail Core by those land uses that do require such accessibility (see Chapter 6). The areas that these firms will move to can be anticipated to be either the high redevelopment potential areas in the western periphery, or to new buildings on the currently vacant areas of the Foreshore. It should be noted that despite the high redevelopment potentials common to the western periphery, that area is poorly situated with respect to the city as a whole. Should a decision be taken to proceed with proposals for the redevelopment of the Granger Bay/Alfred Basin area, it is likely that future CBD growth will be diverted to the axis extending from Thibault Square northward to the Alfred Basin. Such a development would be likely to result in greatly reduced redevelopment interest in the western periphery, and possibly throughout the entire old city area.

OTHER SIGNIFICANT CONSIDERATIONS

The current major problem in the CBD, as identified by the questionnaire survey, is the lack of adequate parking. Continued growth in CBD employment combined with a continuation of the trend toward increased usage of private transport can only result in an increase in both parking problems and traffic congestion in general.

It was estimated that in 1980 there were approximately 17,000

parking bays of all kinds (including metered bays) available in the CBD (City Engineer, 1980, vol 11, ppl4-17). Of the total, some 9,300 bays were provided by the 250,874 square metres (2,700,000 square feet) of GCA occupied by parking garages. It is projected that the space available in parking garages will increase by 297,683 square metres (3.2 million square feet) in the period to the year 2000 (Table 7.3 assuming growth at 4.6 per cent per annum). This is equivalent to 11,000 parking bays, indicating a projected supply of covered off street parking for the year 2000 of 20,300 bays to which should be added 7,500 on street bays and such amount as may be provided by parking lots.

The existing parking provision of 17,000 bays is sufficient to allow approximately 26,000 persons to travel to work in the CBD by car, given an average occupancy of 1.5 (Johnston, Richardson and Smoor, 1972, p49). The estimate tallies closely with the findings of the questionnaire which were that 22,700 office workers travelled by car (35 per cent of the total of 77,230 office workers). The difference is accounted for by employees in non-office land uses. It was estimated that employees in non-office land uses travelling to work by car might amount to approximately 6,700 (assuming that the employment generated by non-office land uses (excluding covered parking) is in the same proportion to office employment as is the GCA occupied by non-office land uses (excluding covered parking) to office GCA).

It is projected that 'Central Area' employment by the year 2000

will be between 148,600 and 156,400 persons (City Engineer, 1980, vol 4, ppl3-15). The implication is that between 52,000 and 55,000 persons in all avenues of employment may be expected to travel to work by car per day, on the assumption that the proportion of the total remains 35 per cent. There will thus be a requirement for approximately 35,000 all day parking bays, assuming that the occupancy rate of 1.5 is maintained. Since a total of only 27,800 bays are expected to be available, a deficit of 7,200 bays will arise. The conclusion to be drawn from this finding is that continued growth in the use of private transport at past rates is unlikely to prove possible. It may be necessary to contain the growth in the use of private transport and induce a relative decline in the proportion of those using private transport.¹

In so far as road access is concerned there are presently ten freeway lanes and four arterial traffic lanes leading into the CBD. Road capacities are estimated at 1,500 vehicles per lane per hour for a freeway and 600 vplph for an arterial road. Thus the capacity presently exists to move approximately 18,000 vehicles per hour into the CBD. On that basis it would take about two hours for the projected 35,000 cars to pass a given set of points on the approach roads to the CBD by the year 2000. The increase in vehicular traffic volumes will clearly call for additional

¹ It should be noted that Brand (1978, p6) maintains that 57 per cent of travel to the CBD in the period 7-9 am, representing 54,100 persons, takes place by car. This implies the presence of approximately 36,000 cars in the CBD on an all day basis. The estimate must be seriously questioned on the basis of Brands own estimates of parking availability and the questionnaire data.

road capacity by that time.

It may be concluded that the outlook for travelling to work in the CBD by means of private transport is not encouraging. It would appear that either increased use of public transport, higher vehicle occupancy rates, massive investment in the provision of parking space and roads, curtailment of CBD growth or a combination of these will have to occur.

CONCLUSION

This chapter has shown that the office function in particular has migrated rapidly toward the Foreshore since 1957. The trend, however, is likely to experience a short term slowing in the immediate future. In the short term expansion of office space will be concentrated in the Redevelopment Zone. The retail sector has shown little movement in the past and it is not expected to differ in the future. The Retail Core of the city is thus likely to be entrenched in its present location. Recent redevelopment of shopping within the Retail Core involving the construction of shopping malls is likely to inhibit relocation.

The analyses show that the average size of buildings has grown considerably over time. It is unlikely, however, that future buildings will be much larger than those built in the period since 1970 unless a revision of the bulk planning controls takes place.

It is projected that the office and parking functions of the CBD will continue to experience rapid relative growth, while other sectors will experience only moderate change. Within the office sector it is expected that the Financial and Government sectors will experience the most rapid long term growth. It is projected that by 1986 the CBD property market will be facing a situation of approximately 80,000 square metres (861,000 square feet) of oversupply of office GCA in excess of Natural Vacancy.

By the year 2000, it is estimated that the CBD may contain 3.475 million square metres of total GCA (37.505 million square feet), of which 2.259 million square metres (24.316 million square feet) is likely to be occupied office GCA. The total area would slightly exceed the area presently permitted by the Revised Final Statement of the Proposed Town Planning Scheme (1982), which would imply severe redevelopment pressures and shortages of premises are likely to occur.

It is suggested that there will be some mismatch between the location of demand for GCA and the location of new supply. This arises because the fastest growing land uses are located near the Retail Core, in the Redevelopment Zone and in upper Plein Street, where there is little remaining potential for new development. The most likely areas for the location of additional supply are the western periphery and the Foreshore. The proposed redevelopment of the Granger Bay/Alfred Basin area, however, could be expected to divert future growth away from the western

periphery should the scheme eventually reach fruition. The scheme would give impetus to the creation of a new growth axis extending from Thibault Square northward to the Alfred Basin. Given these circumstances it is expected that the locational patterns identified in Chapter 5 will experience considerable change in the long term.

Finally, it is anticipated that both parking and traffic congestion problems will increase and may noticeably retard future growth of the CBD. An accelerated decentralisation growth trend may be encouraged.

CHAPTER 8

CONCLUSION

This chapter serves to review the principal findings of the study. The findings are considered in the light of the discussion in Chapter 1 of the work that has previously been undertaken on the office sector. Finally, some suggestions are offered that may be of benefit to future researchers in the field.

PRINCIPAL RESEARCH FINDINGS

The land use distribution maps and cluster analysis technique revealed that the majority of office land uses are clustered in particular parts of the Cape Town CBD. Moreover, the evidence suggested that certain land uses exhibited similar location patterns. A Factor Analysis confirmed the existence of common location patterns by identifying six groups of similarly located land uses. On that basis, a model of the spatial organization of the Cape Town CBD was developed (Figure 5.41).

In terms of the model, the six functional zones comprising the Cape Town CBD were identified as follows. Firstly, a zone of Financial, Professional, Import/Export Agency, Personal Service, Business Service, Diplomatic and Vacant offices and Retailers was centrally located in the vicinity of the Retail Core (Factor 1). Secondly, a zone of Shipping Company, Freight Service, Food Company, Oil Company, Computer Service, Advertising Agency, Commercial & Industrial, Business Service, Insurance Broking,

Accounting and Estate Agency offices and Parking garages was centrally located but on the Foreshore area north of the Retail Core (Factor 2). Thirdly, a zone of Airline, Building Society, Freight Service, Film & Entertainment and Architectural offices and Parking garages was centrally located in the vicinity of the northern component of the Retail Core and the Redevelopment Zone (Factor 5). Fourthly, a zone of Educational, Retail Office, Clothing, Import/Export Agency, Medical Supply, Personal Service and Professional Body offices was centrally located in the vicinity of the southern component of the Retail Core (Factor 3). Fifthly, a zone of Publishing, Charitable, Film & Entertainment, Professional Body, Medical Supply, Building Society and Architectural offices was located in a peripheral crescent shaped distribution in the western area of the CBD (Factor 4). Finally, a zone of Government offices, Parking garages, branch Banks and Diplomatic offices was peripherally located to the east and west of the Gardens, and on the north-eastern Foreshore (Factor 6).

Data collected by means of a postal questionnaire survey revealed that the location pattern depicted in the model conformed in general to the predictions of conventional bid rent theory. The central area of the CBD, however, consisted of three high order (high rental) zones, namely zones represented by Factor 1, Factor 2 and Factor 5. The division arose due to the effects of locational determinants other than rental, these being identified as principally the importance of client accessibility, linkages and to a lesser extent prestige. The core is surrounded by a low

to intermediate order (low rental) crescent of land uses, represented by Factor 4. Two of the functional zones, however, did not conform to the predicted location patterns. In the case of the zone represented by Factor 3, land uses were primarily low in order, but were concentrated in the vicinity of the Retail Core. The pattern arose from irregularities in the rental pattern resulting from the presence of old, low rental buildings in that area, and a requirement on the part of these land uses for good accessibility to the public. In the case of the zone represented by Factor 6, the distribution displayed a peripheral location, despite the high order character of the component land uses. The pattern was explained in terms of linkages of Government offices to Parliament and other state departments, historical factors, and an overstatement of the rent paying ability of these land uses arising from the averaging process.

It was found that while linkages offered an effective explanation of location patterns in certain cases, they were of only moderate overall significance at the intra-CBD level in Cape Town. It was found that linkages were most significant in instances where the linkage was with an eccentrically located function, such as the courts or the docks. It was suggested that the scale of the Cape Town CBD was such that linkages did not act as a major locational constraint at the intra-CBD level.

The majority of locational patterns were found to have been determined by the relative importance of three of the five hypothesised locational determinants. These were requirements for

accessibility to either corporate and/or general public clients, accessibility to services (effects of linkages) and the level of rental that establishments were prepared to pay. Only in two instances was a requirement for prestige of major importance, while little significance was attached to locations which took into consideration staff convenience.

It was concluded that the six land use zones identified in the Cape Town CBD were the result of common locational requirements, rather than arising from the effects of functional linkages between component land uses. Only in the case of the Foreshore land use zone represented by Factor 2 could it be said that the effects of linkages were significant.

An analysis of past trends demonstrated that the office function, in particular, has migrated rapidly toward the Foreshore since 1957. The Retail Core, on the other hand, has remained virtually static in overall terms. There has, however, been an expansion in the vicinity of the underground mall, with the result that the retail focus of the CBD is now located at the intersection of Strand and Adderley Streets. It was suggested that in the short term, northward migration of the office function was likely to slow, but with a possible resumption of the trend after 1986.

A projection of past trends demonstrated that the most rapid future growth can be expected from the office and parking components of the CBD. Within the office sector, the Financial

and Government office sectors were projected to show the most rapid longterm growth. It was predicted that by 1986 there would be 80,000 square metres (861,000 square feet) of oversupply of office GCA in excess of Natural Vacancy. By the year 2000, however, the projection of 3.475 million square metres of total GCA (37.505 million square feet) would slightly exceed the area permitted by the Revised Final Statement of the Proposed Town Planning Scheme (1982). The implication was that development pressures could be expected to be severe with possible shortages of premises.

The probable location of additional demand for and supply of office GCA was examined. It was found that the most rapidly growing land uses were concentrated in the vicinity of the Retail Core, the Redevelopment Zone and upper Plein Street. The probable locations of additional supply of GCA, however, were found to be the western periphery of the CBD and the Foreshore. Should the Granger Bay scheme reach fruition, it is possible that a growth axis could develop extending from Thibault Square northward in the direction of the Alfred Basin.

Finally, it was considered that both parking and traffic congestion problems would increase and might noticeably retard the future growth of the CBD. An accelerated decentralisation growth trend might be the result.

The study has confirmed the findings of Rannells (1956) that groups of businesses tend to congregate in distinct areas of the

CBD. The reasons for the emergence of land use zones in the Cape Town CBD were also found to be similar to the factors that Rannells (1956) identified as being significant in Philadelphia, namely access to linked functions, access to the market, rental and the quality of the premises.

Whereas Goddard (1968) suggested that groups of closely linked activities were grouped in particular parts of the city, the present study found that this was not the case in the Cape Town CBD, with one exception. The finding implies that a model of optimal location of offices based on linkage considerations, such as that proposed by Croft (1969), is inappropriate.

It is suggested that Pritchards (1975) model of Professional Office location is at least partly invalid in the case of Cape Town. The model (Figure 1.2) implied that the average areas and rateable values of premises occupied by professional offices would increase with increasing distance from the geographic centre of the CBD. This was found not to be the case in Cape Town.

SOME SUGGESTIONS FOR THE FUTURE

It is hoped that the present study will be repeated on a regular basis in the future. This will enable the development of a detailed and consistent time series data base for Cape Town. It would thus be possible to make more accurate and detailed

projections of future trends than has been possible in the present study. It would also allow the evolution of the CBD and it's constituent functional zones to be traced.

It is apparent that considerable potential exists for the development of models of office location. While the present study has served to identify the principal locational determinants operative in the Cape Town CBD, future studies could attempt to quantify the relative weights attached to each determinant by each land use. Potentially, this would facilitate the development of a mathematical model that would explain the locational pattern of offices in the CBD, and which could be used to make predictions.

APPENDIX 1

DAVIES CLUSTER DELIMITATION TECHNIQUE

The description that follows is based on that given by Davies (1965, pp40-43). It should be noted that the procedure used in the present study is the second, or mathematical, method described by Davies. His first method was found to be both complex and time consuming, whereas the latter method permitted a computer program to be devised to perform all the calculations.

- 1) A base map was prepared using the City Council's Valuation Division Map 11 (Scale 1/1,250), provided by the Technical Management Services Department, on a scale of 1/2,800. The lot boundaries of the 449 properties studied were drawn in on this map.
- 2) The next stage was to identify all the occurrences of the office land use under study on the base map. Each lot was identified by a number, and a list of these numbers and the corresponding Gross Construction Area in this land use in the building (i.e. the floor areas of individual organizations in the building were added together) was prepared. Column 1 in Table A.1 illustrates the list of Gross Construction Areas occupied by the Oil & Petrochemical category.
- 3) Squared graph paper was used to read off X and Y axis co-ordinates for the central point of each lot in which the

land use concerned was found. These figures were read off to the nearest millimetre. Columns 2 & 3 in Table A.1 illustrate this stage.

- 4) The weighted centre of gravity of the distribution was calculated by multiplying each X co-ordinate by the corresponding floor area and summing the answers. The sum was then divided by the total floor area occupied by the particular office land use to give the X co-ordinate of the weighted centre of gravity. This procedure was repeated for the Y co-ordinate, with the weighted centre of gravity then being plotted on the base map. This stage is shown in columns 4 and 5 in Table A.1.

- 5) The straight line distance from each lot to the weighted centre of gravity was calculated using Pythagoras' Theorem, namely:

$$\text{DISTANCE} = \sqrt{(x^2 + y^2)}$$

where x and y represent the difference between the co-ordinates of the lot and the weighted centre of gravity on the X and Y axes respectively. These distances are recorded in column 6 of Table A.1 for the present example. These distances were also calculated as a percentage of the sum of all the distances, and this is illustrated in column 7 of the table.

- 6) The floor area of each lot was calculated as a percentage of the total floor area in the particular land use (column 8 in

Table A.1).

- 7) The Factor of Inclusion, $F = \text{Percentage Area} / \text{Percentage Distance}$, was calculated for each lot, which, in Table A.1, is achieved by dividing the result in column 8 by that in column 7. The results are shown in column 9.
- 8) The lots were ranked from the highest to lowest Factor of Inclusion (column 10) and the corresponding percentage floor area was noted for each lot (column 11).
- 9) Finally the percentage floor areas for the ranked lots were calculated as a cumulative percentage (column 12).

In order to delimit the clusters on the map it is necessary to select a percentage enclosure value as a cutoff point. The choice of this value and the final delimitation procedure is described in Chapter 4.

TABLE A1 SAMPLE CLUSTER DELIMITATION CALCULATIONS - CATEGORY 3A OIL & PETROCHEMICAL

COLUMN NO	1	2	3	4	5	6	7	8	9
BUILDING AREA NO. BLDGS	X CO-ORD Y CO-ORD X * AREA Y * AREA DISTANCE % DIST % AREA F = A/D								
1	790	57	345	45030	272550	252.1423	15.71264	1.247966	.0794244
2	11175	38	345	424650	3855375	266.3230	16.59633	17.65319	1.063680
3	4064	185	304	751840	1235456	142.8423	8.901438	6.419917	.7212224
4	13473	266	70	3583818	943110	105.5910	6.580064	21.28335	3.234520
5	20462	272	120	5565664	2455440	61.05189	3.804543	32.32390	8.496133
6	12562	359	162	4509758	2035044	118.4944	7.384163	19.84424	2.687406
7	83	400	158	33200	13114	159.6881	9.951214	.1311154	.0131758
8	41	443	33	18163	1353	245.5525	15.30198	.0647679	.0042326
9	653	494	174	322582	113622	253.0248	15.76763	1.031547	.0654218

TOTALS:

63303

7033.667

AVERAGE AREA

PER LOT

15254705

10925064

1604.710

100

100.0000

240.9792

172.5837

CO-ORDINATES OF WEIGHTED

CENTRE OF GRAVITY

COLUMN NO	10	11	12
LOT NO.	% AREA	CUMULATIVE % AREA	
5	32.32	33.32	LOTS RANKED IN DESCENDING ORDER OF 'F' VALUES 50 % CLUSTER INCLUDES LOTS 5 & 4 80 % CLUSTER INCLUDES LOTS 5, 4, 6 & 2.
4	21.28	53.6	
6	19.84	73.44	
2	17.65	91.09	
3	6.42	97.51	
1	1.25	98.76	
9	1.03	99.79	
7	.13	99.92	
8	.07	99.99	

APPENDIX 2

A SAMPLE OF THE POSTAL QUESTIONNAIRE

POSTAL QUESTIONNAIRE

CASE :.....

CONFIDENTIAL

BLOCK :.....

A RESEARCH PROJECT ON OFFICE DEVELOPMENT AND LOCATION
IN CAPE TOWN'S CENTRAL BUSINESS DISTRICT

CATEGORY:.....

INSTRUCTIONS

PLEASE READ CAREFULLY

- 1 Please answer the questions with respect to ALL the office space which your organisation occupies in the building to which this was addressed. If you also occupy space in buildings elsewhere please DO NOT include these separate offices in your answers.
- 2 If your organisation has an associated or subsidiary organisation with SEPERATE offices in the SAME building as your own please DO NOT include these separate offices in your answers.
(e.g. Acme Holdings Ltd have offices on the 12th floor of the Golden Acre while Acme Industrial Ltd have offices on the 11th floor. Acme Holdings should complete their questionnaire excluding the offices of Acme Industrial)
- 3 In those questions where a choice of answers is provided please place a cross (X) in the space indicated by against the answer or answers which are most appropriate.
- 4 In those questions where you are asked to write your answer in the spaces provided it would be appreciated if you could please do so as fully as possible.
- 5 If you do not know the answer to a particular question please write " DON'T KNOW " in the space provided for your answer.
- 6 If a particular question is not in any way relevant to the activities of your organisation please write " NOT APPLICABLE " in the space provided.
- 7 Where you are asked to rank items please number them in the spaces provided so that " 1 " indicates the greatest importance, " 2 " slightly less importance and so on.
- 8 Please return your completed questionnaire to:

OFFICE DEVELOPMENT PROJECT,
Department of Geography,
University of Cape Town,
University Private Bag,
Rondebosch, 7700.

or alternatively use the envelope provided.

- 9 Should you have any urgent queries please telephone 69-8531 ext 119 and ask for Mr T. Rideout.
-

- 1 Please give the position of the person completing the questionnaire:
(e.g. Director, Secretary, Manager, Technician, etc)
.....
- 2 What is the precise nature of your business?
.....
- 3 Please indicate which one of the following areas most closely approximates to that served by your office:
 - a) An area of Cape Town
 - b) Greater Cape Town
 - c) The Western Cape
 - d) The Cape Province
 - e) South Africa and further afield
- 4 Is your office:
 - a) A head office
 - b) A branch office responsible for one or more sub-offices
 - c) A branch office NOT responsible for sub-offices
 - d) A local independent firm
- 5 In what year was your office established in Cape Town?
(approximately if you do not know exactly)
19.....
Pre 1900
- 6 In what year did you first occupy your present premises?
19.....
- 7 During which period of time were your present premises built?
 - a) Pre 1900
 - b) 1900 to 1939
 - c) 1940 to 1949
 - d) 1950 to 1959
 - e) 1960 to 1969
 - f) Since 1970

8 Were your present premises erected specifically for your occupation?

Yes

No

9 If you have moved to your present address since 1970 what was your last address? (or addresses if you have moved more than once)

.....

.....

.....

10 If you have moved from another location since 1970 please indicate the main reason(s) for your move:

a) demolition of building

b) expiration of lease

c) poor condition/layout/services

d) insufficient floor area

e) inconvenient location

why inconvenient

f) insufficient prestige

g) insufficient car parking

h) rents too high

i) to consolidate scattered offices

j) other (please specify)

.....

.....

11 Do you anticipate moving in the next five years?

Yes

No

12 If you answered YES to question 11 please indicate the main reason(s) :

a) demolition of building

b) expiration of lease

c) poor condition/layout/services

d) insufficient floor area

e) inconvenient location

why inconvenient

f) insufficient prestige

g) insufficient car parking

h) rents too high

i) to consolidate scattered offices

(P.T.O.)

12 j) other (please specify)

.....

13 If you answered YES to question 11 do you have any specific area in mind to move to?

Address: No
 or area

..... Why this area?

14 Was there any particular reason for choosing your present location in preference to any others that you might have been offered?

Please specify:

15 Do you occupy your present premises as:

a) owner
 b) tenant

If you are a tenant please state your monthly rental:

R per month

16 What is the total floor area of your premises (excluding corridors, lifts, etc) ?
 square metres

17 What is the total number of persons working in these premises at the present time? (including Directors, Partners, etc)

Male

Female

18 Please give the breakdown of these numbers in terms of occupation:

Number

a) Directors, Partners, Managers

b) Professional

c) Secretarial

d) Clerical

e) Technical

f) Representatives, etc

g) Trainee

h) Others

(P.T.O.)

- 19 Does the number of people who work in these offices at the present time differ from the number who worked here on July 1st 1978 (or when you opened these offices if after July 1st 1978) ?
- No
 Yes, increased by
 Yes, decreased by
- 20 Do you anticipate an increase in staff needs over the next five years?
- Yes, approximately additional staff
 No
 Don't know
- 21 Does your business have any special needs in terms of office accomodation?
 (e.g. air conditioning for computers, X ray room, dark room, store room, etc)
 Please specify:

- 22 Do you anticipate requiring additional office space during the next five years?
- Yes, about square metres
 No
 Don't know
- 23 Given a free choice and disregarding rentals, etc, where in the central area of Cape Town would you prefer your office to be located?
- a) at the present location
 b) Address/area

- If (b) why is this area preferable?

- 24 What is the maximum rental per month that you would consider paying for an office at the address given in 23?
- R per square metre
- 25 Is there any part of the central area of Cape Town which you would consider as being particularly unsuitable for the location of your office?
- a) Yes, the area
 b) No

26 If you answered YES to question 25 please specify why you consider this area unsuitable:

Reasons:

27 Please specify how your staff travel to and from the office:

Number

a) Private car
 b) Motorcycle
 c) Train
 d) Walk
 e) Bus

28 What is your MAIN method of contact with your clients/customers?

a) By their visiting your firm in your office
 b) By you or your staff visiting them in
 their home/office/elsewhere
 c) By other than face to face contact

29 Are there any particular types of firms/organisations with which your firm needs contact of a face to face nature so frequently that they must be located very close together (say 5 minutes walk) ?

a) Yes, type of firm (s)

 b) No

- 30 Please indicate the frequency with which your firms staff have face-to-face contact with the following categories of firms or organisations WITHIN Cape Towns central area:

Category of Organisation	Daily	Weekly	Monthly	Annually	Irregularly	Never
Banks						
Building Society						
Estate Agents, Developers						
Insurance Companies						
Insurance Brokers, Assesors, etc						
Other Finance (Financial Planner, Trust Co, Stock Broker, Finance Co, etc)						
Medical, Dental, Optical						
Medical Suppliers						
Tailors/Dressmakers						
Domestic Services (Gym, Hairdresser, Jeweller, etc)						
Business Service (Copying, Personnel, Security, Travel)						
Computer Bureaux						
Photographic, Modelling, Film, Entertainment						
Advertising/Public Relations ...						
Agencies (Im/Export, Mnfrs.)						
Architects						
Surveyors/Engineers						
Lawyers						
Accountants						
Publisher/Newspaper						
Mnfrs., inc ESCOM, ISCOR, etc						
Mining Companies						
Agricultural/Food Co						
Oil & Petrochemical						
Construction						
SAR, Car Hire, Taxi's						
Airlines						
Shipping Co's/Agents						
Freight Co						
Professional/Trade Bodies, Unions, etc.						
Local Government						
National Govt, Courts, etc						

31 Please rank the importance to your organisation of the services of the following categories of firms/organisations:

(1 = Most Important to you, 31 = Least important to you)

<u>Category of Organistaion</u>	<u>Rank</u>
Bank	
Building Society	
Estate Agents, Developers	
Insurance Companies	
Insurance Brokers, Assesors	
Other Finance(Stock Broker,Finance Co,Trust Co,etc)	
Medical (Doctor,Laboratory,X Ray Clinic,Optician,etc)....	
Domestic(Tailor,Hairdresser,Jeweller,Gym,etc)	
Business(Printer,Personnel,Travel,Security,etc)	
Computer Services	
Photographic,Film,Modelling, Sound Services	
Advertising/Public Relations Agencies	
Import/Export Agents,Manufacturers Agents	
Architects	
Consulting Engineers/Surveyors	
Lawyers	
Accountants	
Publishers/Newspapers	
Manufacturers inc. Escom, Iscor, etc	
Agricultural/Food Co or Board	
Oil & Petrochemical Co	
Construction Co	
Rail, Bus, Hired Car, Taxi Companies	
Airlines (NOT Travel Agents)	
Shipping Co's, Ships Agents	
Freight Services, Indent Agents, Clearers	
Religious,Educational,Charitable	
Professional/Trade Bodies, Unions(ASSOCOM,etc)	
Local Government, inc. Provincial Administration	
National Government, inc Law Courts, etc	
Embassies & Consulates	

(P.T.O.)

32 Do you have parking places available in your building for your exclusive use?

Yes

No

33 What particular problems, if any, have you encountered at your present location?

a) No problems

b) Please specify:

.....

34 How would you rank the importance of the following factors when choosing a location for your office?

<u>FACTOR</u>	<u>RANK</u>	
Proximity to customers/clients		(1 = Most Important)
Proximity to staff needs (parking,shops,restaurants,station,etc)		
Proximity to functions whose services you frequently require (accountant, court,ad agency,bank,etc)		
Appearance of the premises		
Level of the rental asked		
Other (please specify)		
.....		
.....		
.....		

35 Do you consider it essential that your office be located in the C.B.D.?

No

Yes

If you answered " Yes " to this question please state why you consider that a C.B.D. location is essential to your organisation:

.....

36 Have you considered moving your office to a decentralised location?

No

Yes

If you answered " Yes " please state what you see as the advantages and disadvantages of such a move to your organisation:

Advantages:

.....

.....

.....

Disadvantages:

.....

.....

.....

THANK YOU FOR YOUR CO-OPERATION IN COMPLETING THIS QUESTIONNAIRE

REFERENCES

- Alchian A. & Allen W.R., 1977: Exchange and Production: Competition, Co-ordination and Control, 2nd Edition, Wadsworth, California.
- Alonso W., 1965: Location and Land Use, Harvard University Press, Cambridge.
- American National Standards Institute, 1980: American National Standard - Method for Measuring Floor Area in Office Buildings, Building Owners and Managers Association, Washington D.C.
- Beavon K.S.O., 1969: Land Use Patterns in Port Elizabeth, Balkema, Cape Town.
- * Brand J.G., 1978: Cape Town's Central Business District, City of Cape Town, Cape Town.
- Brand J.G., 1980: Transportation - Needs and Progress in Metropolitan Cape Town, City of Cape Town, Cape Town.
- Cape Town Foreshore Joint Technical Committee, 1948: The Cape Town Foreshore Plan, Government Printer, Pretoria.
- Cape Town Members of the JSE, 1950: Handbook of Principal South African Stocks and Shares, Flesch Financial Publications, Cape Town, April.
- Carter H., 1981: The Study of Urban Geography, 3rd Edition, Edward Arnold, London.
- Cattell R.B., 1978: The Scientific Use of Factor Analysis in Behavioural and Life Sciences, Plenum Press, New York.
- City Engineer, 1980: Cape Town Metropolitan Transport Plan - 1980 to 1985, City of Cape Town, Cape Town.
- City Engineer, 1983: People, Employment and Land in the Eighties, City of Cape Town, Cape Town.
- * City of Cape Town, 1982: Revised Final Statement of the Proposed Town Planning Scheme, as Amended to 26/6/1981, Cape Town.
- Cowan P., Fine D., Ireland J., Jordan C., Meveer D., and Sears A., 1969: The Office, a Facet of Urban Growth, Heineman, London.
- Croft M.J., 1969: Offices in a Regional Centre: Follow Up Studies on Infrastructure and Linkage, Location of Offices Bureau, Research Paper No. 3.

- Davey J.A., 1973: Office Location and Mobility in Wellington, New Zealand Geographer, Vol 29, No. 1, pp120-133.
- * Davies D.H., 1965: Land Use in Central Cape Town: A study in Urban Geography, Longmans, Cape Town.
- Davies R.J. and Rajah D.S., 1965: The Durban CBD: Boundary Delimitation and Racial Dualism, South African Geographical Journal, Vol XLVII, December, pp45-58.
- Daniels P.W., 1975: Office Location - An Urban and Regional Study, Bell, London.
- Daniels P.W., 1983: The Study of Office Location: Retrospect and Prospect, Unpublished Paper Presented at the 1983 Annual Meeting of the AAG, pp1-4.
- Day J.R., 1963: Railways of Southern Africa, Barker, London.
- * Dewar N., 1970: The Frame Area in Cape Town, Delimitation Procedures and the Comparison of Empirical Land Use Patterns with a General American Model, Unpublished MA Thesis, University of Cape Town.
- Dixon W.J., (Ed) 1981: BMDP Statistical Software, University of California, Berkely.
- Ebdon D., 1977: Statistics in Geography - A Practical Approach, Blackwell, Oxford.
- Edgington D.W., 1982 : Changing Patterns of Central Business District Office Activity in Melbourne, Australian Geographer, Vol 15, No 4, pp231-242.
- Finance Week, 1984, February 2.
- Financial Mail, 1984, January 27 and August 3.
- Griffin D.W. and Preston R.E., 1966: A Restatement of the "Transition Zone" Concept, Annals of the Association of American Geographers, Vol 56, No 2, pp 339-350.
- Goddard J.B., 1967: Changing Office Location Patterns Within Central London, Urban Studies, Vol 4, No 3, pp276-285.
- Goddard J.B., 1968: Multivariate Analysis of Office Location Patterns in the City Centre - A London Example, Regional Studies, Vol 2, No 1, pp69-85.
- Haig R.M., 1926: Toward an Understanding of the Metropolis II, Quarterly Journal of Economics, Cambridge, Mass., Vol 40, May, pp402-434.

- Honikmann A.H., (Ed) 1966: Cape Town, City of Good Hope, Timmins, Cape Town.
- Johannesburg Stock Exchange, 1984: The Stock Exchange Hand Book (August), Flesch Financial Publications, Cape Town.
- Johnston G., Richardson B.C. and Smoor P., 1972: Cape Town Central City Study, Unpublished Thesis, University of Cape Town.
- Johnston R.J., 1977: Principal Components Analysis and Factor Analysis in Geographical Research: Some Problems and Issues, South African Geographical Journal, Vol 59, No 1, pp30-44.
- King L.J., 1969: Statistical Analysis in Geography, Prentice Hall, New Jersey.
- Morris S.S., 1960: Freeways, Parking and the City Centre - A Development Plan for Central Cape Town, City of Cape Town, Cape Town.
- Morris S.S., 1975: City for the People, City of Cape Town, Cape Town.
- Murphy R.E. and Vance J.E., 1954: Delimiting the CBD, Economic Geography, Vol 30, No 3, pp189-222.
- O'Hara D.J., 1977: Location of Firms Within a Square Central Business District, Journal of Political Economy, Vol 85, No 6, pp1189-1207.
- Petermann A.H., 1868: Mittheilungen aus Justus Perthes' Geographischer Anstalt über wichtige neue Erforschungen auf dem Gesamtgebiete der Geographie, Justus Perthes, Gotha.
- Piper A., 1974: Internal Dynamics in the Central Business District in Durban 1959-1966, Unpublished MA Thesis, University of Natal (Durban).
- Preston R.E., 1966: The Zone in Transition, Economic Geography, Vol 42, No 3, pp236-260.
- Pritchard G., 1975: A Model of Professional Office Location, Geografiska Annaler, Vol 57B, Part 2, pp100-108.
- Province of the Cape of Good Hope, (as updated): Consolidated Cape Provincial Ordinances, Juta, Cape Town.
- * Rannells J., 1956: The Core of the City, Columbia University, New York.

- Rideout T.W., 1982: A Rating System - A Case Study of the Distribution of Costs and Benefits in Cape Town, Unpublished Honours Project, University of Cape Town.
- Rummel R.J., 1968: Understanding Factor Analysis, Journal of Conflict Resolution, Vol XI, No 4, pp444-480.
- South Africa, 1960: Union Statistics for Fifty Years, Jubilee Issue 1910 - 1960, Government Printer, Pretoria.
- South Africa, 1966: 1960 Census: Report on the Metropolitan Area of Cape Town, Vol 2, No 1, Government Printer, Pretoria.
- South Africa, 1975: Population Census 1970: Occupations, Government Printer, Pretoria.
- South Africa, 1977: Population Census 1970: Metropolitan Area Cape Town, Government Printer, Pretoria.
- South Africa, 1982: South African Statistics 1982, Government Printer, Pretoria.
- State of South Africa Yearbook, 1974, Da Gama, Johannesburg.
- Stopher P.R. and Meyburg A.H., 1979: Survey Sampling and Multivariate Analysis for Social Scientists and Engineers, Heath & Co, Lexington.
- Wishart D., 1982: Clustan, Program Library Unit, Edinburgh.